Journal of FORESTRY

JULY 1957

SOCIETY OF AMERICAN FORESTERS 1900

Volume 55
Number 7

Remember—

And Remember Also

INDIAN

FIRE PUMPS

ARE "ONE MAN" FIRE DEPARTMENTS

Next to preventing fires, the most important thing is to put them out fast. INDIANS are *"worth their weight in gold"* when you need quick action. That's why they are choice for quality among fire fighters the world over.

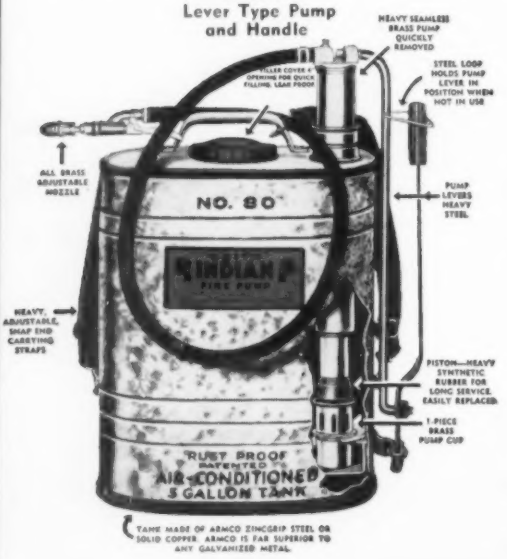
Available in INDIAN FIRE PUMP No. 90 sliding pump type. Also made with lever type pump and handle— the No. 80.

SEND FOR CATALOG

INDIAN FIRE PUMP

NO. 80

Lever Type Pump and Handle

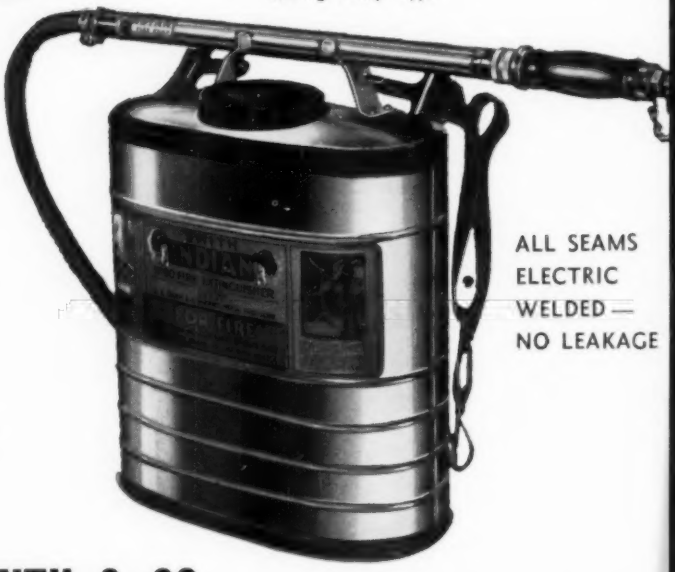

HEAVY SEAMLESS BRASS PUMP QUICKLY REMOVED
STEEL LOOP HOLDS PUMP LEVER IN POSITION WHEN NOT IN USE
ALL BRASS ADJUSTABLE NOZZLE
PUMP LEVERS HEAVY STEEL
NO. 80
INDIAN
FIRE PUMP
HEAVY, ADJUSTABLE, SNAP END CARRYING STRAPS
PISTON—HEAVY SYNTHETIC RUBBER FOR LONG SERVICE. EASILY REPLACED
1-PIECE BRASS PUMP CUP
"RUST PROOF" PATENTED AIR-CONDITIONED 5 GALLON TANK
TANK MADE OF ARMCO ZINCGRIP STEEL OR SOLID COPPER. ARMCO IS FAR SUPERIOR TO ANY GALVANIZED METAL.

BOTH STYLES OF **INDIAN** FIRE PUMPS APPROVED BY UNDERWRITERS' LABORATORIES

INDIAN FIRE PUMP

NO. 90

Sliding Pump Type



ALL SEAMS ELECTRIC WELDED— NO LEAKAGE

D. B. SMITH & CO.

"FOR OVER 70 YEARS THE LEADERS"

407 MAIN ST. UTICA 2, N. Y.

Canadian Agents:

Fleck Bros., Ltd. Vancouver, B. C., Canada

C. E. Hickey & Sons, Ltd. Hamilton, Canada

Bisen Hardware Co. Toronto, Ont., Canada

Pacific Coast Branches:

Hercules Equipment & Rubber Co., Inc. San Francisco 7, Calif.

Klamath Falls, Ore. Los Angeles 15, Calif.

Fred E. Barnett Co. Portland, Ore.

Fred E. Barnett Co. Halprin Supply Co.

Mill & Mine Supply Co. Seattle 4, Wash.

L. M. Curtis & Sons Salt Lake City, Utah

VOLUME 55 • NUMBER 7 JULY 1957

Journal of Forestry

Editorial Staff

ARTHUR B. MEYER ..... *Editor*

HENRY CLEPPER ..... *Managing Editor*

L. AUDREY WARREN ..... *Business Manager*

Associate Editors

R. KEITH ARNOLD, *Forest Fire*, California Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.

ROBERT R. BLUMENSTEIN, *Forest and Wood Utilization*, Timber Engineering Company, 4812 Minnesota Avenue, N. E., Washington 19, D. C.

ROBERT E. DILS, *Watershed Management*, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

JOHN W. DUFFIELD, *Silviculture*, Col. W. B. Greeley Forest Nursery, P. O. Box 172, Nisqually, Wash.

S. R. GEVORKIANTZ, *Mensuration*, Lake States Forest Experiment Station, University Farm, St. Paul 1, Minn.

HARVEY J. MACALONEY, *Forest Pathology and Entomology*, Lake States Forest Experiment Station, St. Paul Campus, University of Minnesota, St. Paul 1, Minn.

RALPH W. MARQUIS, *Forest Economics and Policy*, Northeastern Forest Experiment Station, 102 Motors Avenue, Upper Darby, Pa.

CHARLES E. POULTON, *Range Management*, Withycombe Hall 302, Oregon State College, Corvallis, Ore.

CLARENCE W. RICHEN, *Forest Management and Engineering*, Crown Zellerbach Corporation, Public Service Building, Portland 4, Ore.

PHILIP C. WAKELEY, *Forest Genetics and Artificial Regeneration*, Southern Forest Experiment Station, 704 Lowich Building, 2026 St. Charles Avenue, New Orleans 13, La.

LEE E. YEAGER, *Forest-Wildlife Management and Recreation*, Colorado Cooperative Wildlife Research Unit, 243 Forestry Buidling, Colorado State University, Fort Collins, Colo.

LLOYD THORPE, *Advertising Representative*, 6133 Arcade Building, Seattle 1, Wash.

The JOURNAL OF FORESTRY, established in 1917, is the official organ of the Society of American Foresters, but the Society assumes no responsibility for the statements and opinions expressed by contributors.

Publication office, 425 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Address all correspondence concerning editorial or business matters to JOURNAL OF FORESTRY, 425 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Published monthly. Subscription $7.50 per year; single copies 75 cents. Missing numbers will be replaced without charge provided claim is made within thirty days after date of the following issue.

The editors are not responsible for loss or damage of manuscripts and photographs while in transit or in their possession. All material submitted for publication should be accompanied by return postage.

Copyright, 1957, by the Society of American Foresters. **Entered as second-class matter at the post office at Washington, D. C. Acceptance for mailing at the special rate of postage provided for in the Act of February 28, 1925, embodied in Paragraph 4, Section 412, P. L. and R. authorized November 10, 1927.**

CONTENTS

COVER: Camping and Picnicking, Pike National Forest, Colorado.
Photo Courtesy of U. S. Forest Service by Leland J. Prater.

Oak Wilt Spread and Damage in the Southern Appalachians ..... *John S. Boyce, Jr.* 499

California Black Oak—Its Management and Economic Possibilities ..... *Milton B. Edwards* 506

Growth and Specific Gravity Responses in a Thinned Red Pine Plantation ..... *Benson H. Paul* 510

A Selected Annotated Bibliography of Aerial Photo Interpretation Keys to Forests and Other Natural Vegetation ..... *Grover A. Choate* 513

Some Observations of an Undescribed Disease of Ponderosa Pine Twigs ..... *Leon I. Cohen* and *Charles W. Waters* 515

Early Responses of Some Southern Tree Species to Gibberellic Acid ..... *Thomas C. Nelson* 518

Economic Size of Forestry Operations ..... *Marion Clawson* 521

Educational Responsibilities and the Farm Unit Approach Utilization, and Processing ..... *H. P. Berthy* 527

Notes 529
Effect of Livestock Concentration on Surface-Soil Porosity Within Shelterbelts; Second Meeting on International Forestry Statistics; Rooting American Sycamore Cuttings.

Points of View 533
Comments on "Government Social Programs and Forestry"; The Division of Range Management—its Service to Forestry.

Reviews 536
An Outline of Norwegian Forestry; Manual for Analysis of Rodent Populations; Forestry Education in Pennsylvania; Vermont Dairy; Publications of Interest.

Current Literature 539

Society Affairs 540

Forestry News 554

Index to Advertisers 560

KEEP LOGS ROLLING

with Action like this . . .

Truckloads of logs roll fast and smoothly when an Allis-Chalmers 120-hp Forty Five motor grader handles haul road maintenance.

This machine has the capacity and power to keep many miles of road in top shape. Its high-arch front axle and 30-in. throat clearance allow the Forty Five to straddle big windrows. ROLL-AWAY moldboard lifts dirt up and away from the blade edge . . . keeps it light, loose and rolling . . . reduces friction drag . . . allows most efficient use of the Forty Five's powerful engine. You save fuel and get more work per horsepower on rough grading, ditching, sloping and other heavy-duty jobs in the woods.

See the Forty Five in action. Let your Allis-Chalmers dealer show you how more power at the wheels, more dirt at the blade, plus precision control and ease of operation combine to speed hauling work and cut haul road maintenance costs. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.

ROLL-AWAY is an Allis-Chalmers trademark

ALLIS-CHALMERS *Engineering in Action*

Journal of Forestry

Official Organ of the Society of American Foresters

Oak Wilt Spread and Damage in the Southern Appalachians[1]

John S. Boyce, Jr.
Plant pathologist,
Southeastern Forest Experiment Station,
Forest Service,
U. S. Department of Agriculture,
Asheville, North Carolina

OAK WILT, caused by the fungus *Ceratocystis fagacearum* (Bretz) Hunt, is known to have occurred in the Upper Mississippi Valley prior to 1941 (*9*), but it was not detected in the Southern Appalachians until 1951. Through 1956, surveys of different intensities have shown wilt to be present in counties of six Southern Appalachian states as follows:

State	*Number of oak wilt counties*
Kentucky	26
Maryland	3
North Carolina	4
Tennessee	15
Virginia	8
West Virginia	39

Figure 1 shows the distribution of oak wilt by counties at the end of 1956 as determined by state and federal surveys.

During the period 1951-1956, the Southeastern Forest Experiment Station studied oak wilt spread and damage in North Carolina and Tennessee, and these observations give a picture of the behavior of the disease in the southeastern part of its known range.

In 1954 and each summer since then, Buncombe and Haywood Counties, North Carolina, and Greene County, Tennessee, have received complete aerial coverage through joint state-federal cooperation. These counties are regarded as sample areas by means of which oak wilt behavior is judged in the two states. Most known infection centers in both states have been visited each year since detection, and immediate vicinities have been carefully ground-scouted for local spread of the disease. Scouts travelling between previously discovered infection centers have found many new ones.

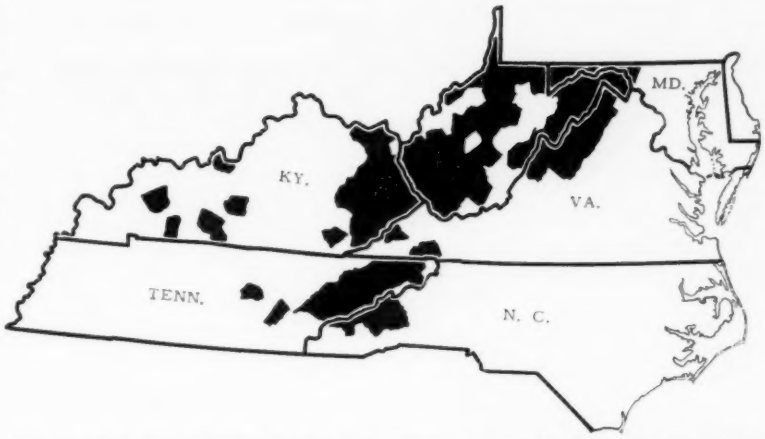


FIG. 1.—Oak wilt distribution in the Southern Appalachian States through 1956, by counties.

About 250 oak wilt infection centers have been found in both states, most of which were confirmed by culturing the wilt fungus from at least 1 tree at each center. An infection center is defined as 1 or more wilting trees within 50 feet of each other, and any dead stems or stumps of probable wilted oaks. These centers undoubtedly represent only a part of the total. Except for 2 counties in middle Tennessee, the disease areas are contiguous in western North Carolina and eastern Tennessee.

The purpose of the intensive study of these infection centers is to provide information on dates of origin, increase in size and number of centers, characteristics of spread,

TABLE 1.—ESTIMATED YEARS OF ORIGIN OF OAK WILT CENTERS IN NORTH CAROLINA AND TENNESSEE

Year centers found	Total centers	Estimated year of origin											
		1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
	Number	*Number of centers*											
1951	14	1	1	1	1	2	5	3	..	..	..	..	..
1952	11	0	0	0	1	1	1	3	5	..	..	..	..
1953	30	0	1	0	3	1	3	2	4	16	..	..	..
1954	62	0	0	0	0	1	6	11	13	8	23	..	..
1955	40	1	0	0	0	0	0	1	8	5	8	17	..
1956	67	0	5	0	2	0	4	5	8	12	16	6	9
Total	224	2	7	1	7	5	19	25	38	41	47	23	9

[1]The cooperation of the Divisions of Forestry of Kentucky, North Carolina, Tennessee, and Virginia in various aspects of the work is gratefully acknowledged. Special thanks are also due H. J. Duncan and W. A. Stegall, Jr., of the Southeastern Forest Experiment Station, for their help in these studies.

effects of control, and any other factors that would aid in the evaluation of the oak wilt situation in these states. When each center was found, data were taken on the species, sizes, and crown classes of wilting trees; the number of dead oaks; estimated year of origin of the center; and the area of the center as determined by the crowns of wilting trees and dead suspects.

Description of Infection Centers

The oldest active centers originated about 1945, as judged by the condition of the dead trees, supplemented in some cases by the landowners' recollections of when the trees began to die (Table 1). However, oak wilt may have been established in this area before 1945. It is possible that earlier centers did not have actively wilting trees at the time of surveys to enable their detection. Relatively few centers have been found which were estimated to have started before 1950. This may be partly the result of the natural cessation of oak wilt spread at some centers.

There was no increase in number of new centers in 1955 and 1956 compared with centers originating during the preceding four years. The following tabulation for Greene County, Tennessee, shows no marked increase in rate of new wilt center formation since 1951:

Estimated year of origin	*Number of oak wilt centers*
1945	1
1946	2
1947	0
1948	1
1949	1
1950	3
1951	7
1952	10
1953	7
1954	13
1955	10
1956	2

The decrease from 10 centers originating in 1955 to 2 centers in 1956 may be partly due to the application of control measures beginning in 1955.

From the standpoint of total acreage involved and number of trees killed by wilt at known centers, the damage is as yet very small in the sample areas (Table 2).

TABLE 2.—EXTENT OF OAK WILT IN PARTS OF NORTH CAROLINA AND TENNESSEE, FOR THE PERIOD 1951-1956

Area	Total centers	Combined area of centers	Total wilt-killed trees
	Number	*Acres*	*Number*
Greene County, Tennessee	56	8.5	270
Buncombe and Haywood Counties, North Carolina	55	9.5	309

The active infection centers in the two states ranged in size from a single wilting oak to one center of about 1 acre. The average area per center at the time of detection was 0.16 acre with 3.3 dead and dying oaks. The oldest centers, estimated to have started about 10 years before they were detected, each averaged 0.4 acre and contained 21 dead and dying oaks when found.

The following tabulation based on 114 centers distributed throughout the oak wilt range in the two states shows that an average of from 0.8 to 2.1 trees became infected at each center each year from the time of inception until detection.

Estimated age of centers (Years)	*Average infected trees per center* (Number)	*Average trees infected per year* (Number)
10	21.2	2.1
9	-	-
8	6.5	.8
7	15.0	2.1
6	10.0	1.7
5	9.8	2.0
4	7.7	1.9
3	5.9	2.0
2	3.6	1.8

The mean number of trees that died per year was no higher for the older centers than for the newer. One would expect that, if localized spread at centers was chiefly by root grafts, the number of trees killed per year per center would increase markedly with time. This was not the case.

Progress of Wilt at Centers

Periodic activity of centers.—Fifty-two infection centers of various ages that contained one or more wilting trees when they were found were subsequently observed each year for 3 years (Table 3). During this period, 46 percent of them became inactive naturally as judged by the lack of new wilt trees at them for 3 successive years. None of the smaller numbers of centers observed for 4 or 5 successive years had additional wilt after they were inactive for 3 years.

TABLE 3.—ACTIVITY OF OAK WILT CENTERS IN NORTH CAROLINA AND TENNESSEE FOLLOWING DETECTION

Oak wilt centers	Years observed	Centers active during period	
Number	*Number*	*Number*	*Percent*
12	5	7	58
22	4	9	41
52	3	28	54

The natural cessation of wilt activity at some infection centers is important from the control standpoint. Oak wilt control efforts in some parts of the eastern United States have included cutting and poisoning either all healthy oaks or oaks of the same species group within 50 feet of infected trees in order to stop root-graft spread of the disease. Such a procedure is desirable where centers are hard to reach by control crews. However, if centers are readily accessible, there can be advantages to observing them for a few years after treating only the wilting trees and avoiding the poisoning of a zone of healthy trees at centers where no further infections occur for 3 years. At least 3 years of follow-up observations would be necessary in North Carolina and Tennessee because an occasional center had no new wilt for 2 successive years, and then showed more wilt killing the third year.

Oak mortality in plots.—Oak mortality due to wilt was observed on 54 widely distributed plots that were established during 1952-1954. Each plot was of 50-foot radius, was well stocked with oaks, and had a currently wilting red oak at its center. In 17 plots the wilting center tree was the only infected tree on the plot. In 37 plots there was an average of 2.6 wilt-killed oaks in addition to the center tree.

The center trees were cut and

TABLE 4.—OAK MORTALITY DUE TO WILT IN PLOTS OF 50-FOOT RADIUS

Time since plots established	Total plots	Total oaks[1]	Infected trees	Cumulative mortality
Years	*Number*	*Number*	*Number*	*Percent*
ALL PLOTS WHERE CENTER STUMPS WERE NOT POISONED				
1	38	427	20	4.7
2	35	384	47	12.2
3	30	352	59	16.8
4	15	158	37	23.4
ALL PLOTS WHERE CENTER STUMPS WERE POISONED[2]				
1	16	242	4	1.7
2	16	242	7	2.9
PLOTS WITH SINGLE WILT TREE ONLY—CENTER STUMPS NOT POISONED				
1	15	204	4	2.0
2	14	194	10	5.2
3	13	183	17	9.3
4	5	56	4	7.1
PLOTS WITH SINGLE WILT TREE ONLY—CENTER STUMP POISONED				
1	6	93	0	0
2	6	93	2	2.2

[1]Includes white and red oaks 1 inch d.b.h. and larger.
[2]Heavy applications of Ammate crystals were applied to the freshly cut sapwood of the stump surfaces.

part or all of the stems were sprayed with various concentrations of benzene hexachloride and pentachlorophenol in fuel oil as part of another study. Ammate (ammonium sulfamate) was applied to the stumps of the center trees at the time of cutting in the 16 plots of 1954. None of the center stumps of the 38 1952 and 1953 plots was treated. All healthy oaks 1 inch d.b.h. and larger were tallied in the plots at the start. Trees that developed wilt were noted during visits in succeeding summers.

Although the results are no more than suggestive because of the differences in stem treatments of the center trees, observations on mortality through 1956 are given in Table 4. The table is divided on the basis of whether the stumps of the center trees received Ammate, and on the number of wilting and wilt-killed trees in the plots at the start. Plots with untreated center stumps showed more disease spread when they contained wilt-killed trees in addition to the actively wilting tree at the start than when each contained only a single infected tree. Regardless of whether only plots with single infected trees or all plots are considered, the incidence of wilt by the end of the second year was lower where the infected center stumps received Ammate than where the center stumps were not treated. Figure 2, which is based on all plots, shows that in 4 years, 37 percent of the red oaks became infected, as compared with 23 percent of all oaks.

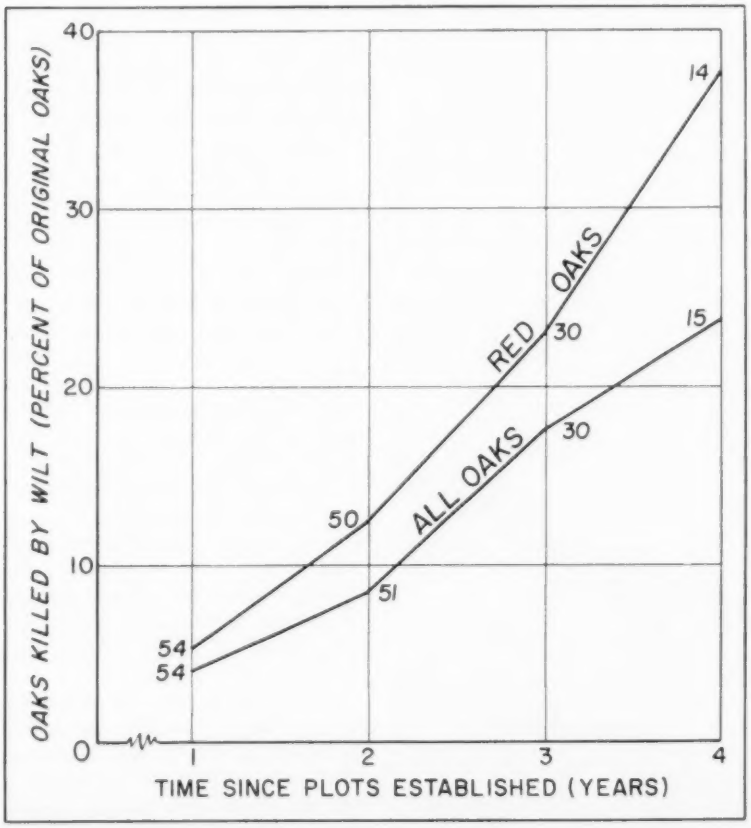


FIG. 2.—Relation between time and oak mortality due to wilt on plots of 50-foot radius in North Carolina and Tennessee.

Characteristics of Oak Wilt Spread

Proximity of wilting oaks at infection centers.—During 1956, data were taken on 224 wilting oaks at 163 infection centers in Kentucky, North Carolina, and Tennessee on the distance between each wilting tree and the nearest dead standing oak or recently cut stump. A tabulation of this information follows:

Distance to nearest dead oak or stump (Feet)	*Wilting oaks* (Number)	(Percent)
1-10	51	22.8
11-20	79	35.3
21-30	46	20.5
31-40	19	8.5
41-50	21	9.4
51-60	6	2.7
61-100	2	.9

Ninety-six percent of the wilting oaks were within 50 feet of trees

that probably died as a result of wilt; 78 percent were within 30 feet. The proximity of the wilting oaks to trees that were probably wilt killed shows that most of the disease spread at the centers was either due to root grafts between diseased and healthy trees or to very short overland transmission of the fungus, or to both.

Incidence of infected white oaks.—During the period 1954-1956, a total of 494 actively wilting oaks was found in North Carolina and Tennessee, of which only 11 (2.2 percent) were white oaks, either *Quercus alba* L. or *Quercus stellata* Wangenh. All infected white oaks were less than 50 feet from previously infected oaks; and most of them were within 30 feet. The low incidence of infected white oaks is probably due in part to the difficulty of recognizing oak wilt symptoms in some of them.

Single tree infections.—The term "single tree infections" is used to denote those which resulted from overland spread of the oak wilt fungus, since the wilting trees were beyond possible root-grafting distances from previously infected oaks. During 1954-1956, 78 single tree infections were found in Kentucky, North Carolina, and Tennessee. All of the wilting oaks were of the red oak group, and 80 percent of them were 11 inches d.b.h. or larger. Nearly half of the infected single trees were *Quercus velutina* Lam. with *Q. coccinea* Muenchh., *Q. falcata* Michx. and *Q. rubra* L. among the remaining.

Oak wilt distribution in Greene County, Tennessee.—Three successive years of complete aerial surveys have probably resulted in finding most of the oak wilt centers in Greene County, Tennessee. The centers tend to be clustered, meaning that most of the oak wilt spread has occurred near previously established centers (Fig. 3). Within this county, the disease has been slow to move out into the large, disease-free areas in recent years. Since wilt spread is slow and takes place largely near established infection centers, the value of treating wilting trees at those centers is obvious. Under these conditions, the chances for successfully containing the disease within limited areas should be better than if the disease normally and readily made long overland jumps.

FIG. 3.—Locations of oak wilt centers found in Greene County, Tennessee, 1951-1956.

Tests Showing Root Grafting

Although the intergrafting of oak roots has been established by others (*9, 12, 16*), some grafting tests were made in North Carolina because the incidence of grafts between oaks in the Southern Appalachians might be different from that elsewhere. Tests of oak root grafting by copper sulfate poisoning were made in two areas of the Bent Creek Experimental Forest near Asheville, North Carolina. The oak stands were on eroded loam soils having good internal drainage, and the treated trees ranged in size from 7 to 13 inches d.b.h. Red oaks in the stands consisted of *Quercus coccinea* and *Q. velutina*. White oaks were *Q. alba* and *Q. prinus*.

Table 5 gives the number of oaks that were poisoned as well as the average number of living oaks within 25 feet of them. In most instances both red and white oaks were within 25 feet of the treated trees. The tests were made about mid-August in 1955 and 1956. Test trees were cut, and watertight walls were made around the tops of the stumps, using roofing paper, roofing cement, and rubber bands from tire inner tubes (*16*). In general, 2 ounces of copper sulfate crystals dissolved in 2 gallons of water were added to the reservoir on each stump. Symptoms of copper poisoning developed in the foliage of some nearby oaks within 7 days.

Symptoms in the red oaks were interveinal necrosis in the leaves followed by heavy defoliation so that only a few leaves remained on the trees after several weeks. Some of the shed red oak leaves were similar in appearance to the

TABLE 5.—OAKS USED IN COPPER-POISONING TESTS OF ROOT GRAFTS

Location	Year of test	Oaks poisoned		Oaks within 25 feet of each poisoned tree
		Red oaks	White oaks	
		Number	*Number*	*Average number*
1	1955	7	5	9
2	1956	17	11	10

TABLE 6.—OAKS SHOWING ROOT GRAFTS IN COPPER-POISONING TESTS

Year of test	Treated tree		Copper symptoms tree		
	Species	D.b.h.	Species	D.b.h.	Distance
		Inches		*Inches*	*Feet*
1955	*Q. velutina*	9.3	*Q. alba*	9.3	9
			Q. alba	7.3	8
1955	*Q. velutina*	10.5	*Q. alba*	10.4	28
1955	*Q. coccinea*	8.3	*Q. coccinea*	9.2	8
1956	*Q. coccinea*	8.1	*Q. coccinea*	9.4	11
1956	*Q. coccinea*	10.1	*Q. coccinea*	9.3	12
1956	*Q. coccinea*	7.9	*Q. coccinea*	6.3	11

so-called "water soaked" leaves characteristic of wilt-infected trees. Symptoms of copper poisoning were different for the white oaks. There was no leaf shedding. Interveinal necrosis was marked but the affected leaves were only on the side of the tree facing the copper-poisoned stumps.

Table 6 presents information about the grafted trees. Three cases of root grafting between *Q. velutina* and *Q. alba* were found in 1955. No grafts between red and white oaks were detected in the 1956 tests. The greatest distance between known grafted trees was 28 feet; the average distance was about 12 feet. The tests confirmed the presence of root grafts between oaks in the two areas (Fig. 4). However, it is not known how sensitive the copper-poisoning method is for detecting oak root grafts and, as a consequence, whether more than 15 percent of the treated oaks were grafted.

Our results agree closely with those obtained elsewhere in the East.[2] In Pennsylvania, 10 percent of copper-sulfate treated oak stumps were found to be root grafted to adjacent oaks, and in West Virginia similar studies of 60 injected oaks showed 10 percent of them to be root connected. Root grafts occurred between oaks as far as 28 feet apart in Pennsylvania and 26 feet apart in West Virginia.

Root grafts between wilt-infected oaks and nearby healthy oaks serve to spread the wilt disease locally (*12*). Such grafts could account for the finding that 78 percent of the wilting oaks examined in 1956 were within 30 feet of previously wilt-infected oaks.

Control Measures

A previous study (*2*) showed that DDT, benzene hexachloride, and pentachlorophenol in fuel oil when applied as a spray to the bark of felled oak wilt trees greatly reduced the number of cambial and wood-boring insects infesting the contaminated material, and also reduced the number of living nitidulid beetles on mats of the oak wilt fungus.

Evidence has accumulated that much of the natural overland spread of oak wilt occurs in the spring when the new vessels are open (*6, 10, 13, 14*). Mats of the fungus which may develop between the bark and the wood within a few months after infected oaks die are regarded as important sources of inoculum, and certain insects which frequent the mats may transmit the fungus to wounds on healthy trees (*5, 8, 11*).

Mats may not be the only sources of inoculum, however, since certain bark- and wood-boring insects have been implicated as possible vectors (*1, 15*). Regardless of what kind of insects may spread infection overland, spraying the bark of freshly cut wilting trees with an insecticide is considered to merit consideration as a control measure, in view of the reduction of insect activity in wood, bark, and mats.

Accordingly, the control work which has been done by the Divisions of Forestry in North Carolina and Tennessee has consisted of cutting and spraying wilting oaks during the summer, if possible. The freshly cut stumps have been poi-

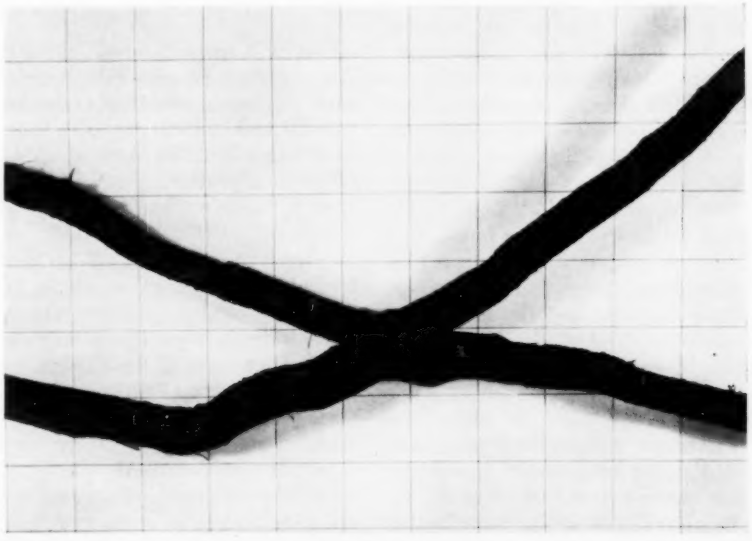


FIG. 4.—Graft between red oak roots that was found as a result of copper-poisoning test. Squares in background are 2x2 inches.

[2]Minutes of regional oak wilt meeting, Romney, West Virginia, August 16-17, 1956. [Processed.]

TABLE 7.—NUMBER OF SINGLE TREE OAK WILT CENTERS IN TWO AREAS

Year	Centers found that year	Centers found later and dated back	Total centers	Control treatments
	BUNCOMBE AND HAYWOOD COUNTIES, NORTH CAROLINA			
1954	9	12	21	Against 1954 trees
1955	3	1	4	Against 1955 trees
1956	4	--	4	----------
	GREENE COUNTY, TENNESSEE			
1954	7	6	13	None
1955	8	2	10	Against 1955 trees
1956	2	--	2	----------

soned with Ammate by placing a thick layer of dry crystals on the exposed sapwood and in cups in the buttress roots. Earlier it was found that summer cutting of wilt trees reduced the incidence of mats on them. No mats were observed on summer-cut trees the following spring, when they might have been most hazardous from the oak wilt spread standpoint (*3*).

The felled trees have been heavily sprayed to a diameter limit of about 3 inches on the main stem and larger branches. Some trees have been bucked into logs to facilitate thorough spray coverage of the bark and to hasten drying. The experimental spray was modified for control use by eliminating the DDT. As used by the state control crews, the spray contained 0.5 percent gamma isomer benzene hexachloride and 2.0 percent pentachlorophenol in No. 2 fuel oil. The pentachlorophenol was included because of the report that the wilt fungus had fruited on exposed, peeled billets under moist conditions in Pennsylvania (*7*).

Table 7 shows the number of single tree, and therefore largely current, infections that were found in the sample areas each year from 1954 through 1956. Considering only active new centers found each year or active new centers plus those found later and dated back, there has been a decrease in overland spread of wilt following control treatments. Unfortunately, it has not been possible to set aside check areas because the states have active oak wilt control programs. While it is not possible to say that the control treatments alone reduced overland spread of wilt, it is significant that the incidence of single tree infections dropped in both areas the year after control work was started, even though the starting year was different in the two states.

Discussion

Several observations have been made that are helpful in interpreting the oak wilt problem in North Carolina and Tennessee. Oak wilt is probably of recent origin in this part of the Southern Appalachians. The oldest known infection centers date from about 1945, and most are small. In contrast to some of the midwestern states, except for areas of less than an acre, no woodlands have yet been observed where wilt has killed a high percentage of the oaks. The effect of wilt on the volume of merchantable oaks is so far very small —quite a different situation from that reported for eight counties in Wisconsin, where it is estimated that 0.3 percent of the total oak volume is killed by wilt each year (*1*).

Oak wilt has not spread rapidly. Apparently some new centers arise each year as a result of overland spread and some centers permanently cease to be active. Also, there is a clustering of infection centers rather than pronounced movement of the disease into previously wilt-free areas. Most local spread has taken place within 50 feet of previously diseased trees. Thus there is a good possibility of holding damage to low levels by timely applications of control measures, and available evidence suggests that summer cutting and spraying of currently infected trees offers a practicable means for reducing overland spread of wilt.

The disease should not be ignored in these states because it is not spreading rapidly. Rather, this report should encourage detection and control measures now while the task of controlling it appears practicable. Although there is no certainty that it will ultimately cause losses in the southern Appalachians comparable to those reported for parts of the midwestern states, this is possible. Fortunately, all of the Appalachian states having the disease within their borders have some type of control under way. An intensification of these efforts, with follow-up studies on accomplishments, will go far to minimize this problem.

Summary

Oak wilt has been found in the southern Appalachian states of Kentucky, Maryland, North Carolina, Tennessee, Virginia, and West Virginia. During the period 1951-1956, the Southeastern Forest Experiment Station studied oak wilt spread and damage in North Carolina and Tennessee.

About 250 oak wilt infection centers were found in these two states. The oldest active centers originated about 1945. There was no increase in number of new centers per year in 1955 and 1956 compared with centers starting during the preceding 4 years. The oldest centers were 10 years old when found and averaged 0.4 acre in area and 21 dead and dying oaks each. An average of from 1 to 2 oaks became infected per year at 114 centers from the time of their inception until they were detected, regardless of year of origin.

Nearly half of 52 centers that were observed for 3 years ceased activity naturally, even though they were surrounded by living oaks. Only 2 percent of wilting oaks found over a 3-year period were of the white oak group. In 4 years, 23 percent of all oaks became infected in plots of 50-foot radius, each of which had at least one wilting oak at its center at the start. Wilt incidence was lower after 2 years in plots where the stumps of the felled and sprayed infected center trees were treated with Ammate than in plots where the center trees were not poisoned.

At 163 infection centers, 96 percent of the wilting oaks were within 50 feet of probable wilt-killed trees; 78 percent were less than 30 feet away. Tests with copper sulfate showed that 6 of 40 poisoned oaks were root grafted to nearby oaks. Three cases of grafts between red and white oaks were noted. Eighty percent of wilting oaks that constituted single tree (overland) infections over a 3-year period were 11 inches d.b.h. or larger. Infection centers tend to be clustered, as illustrated by one Tennessee county that was repeatedly and fully surveyed. There has been relatively little movement of oak wilt into disease-free parts of this county in recent years.

Sharp reductions in the number of new infection centers followed control measures in two study areas. Control measures consisted of cutting wilting trees in the summer and spraying them with benzene hexachloride and pentachlorophenol in fuel oil. Stumps were poisoned with Ammate.

Literature Cited

1. ANDERSON, R. L. and D. D. SKILLING. 1955. Oak wilt damage—a survey in central Wisconsin. U. S. Forest Serv. Lake States Forest Expt. Sta. Paper 33, 11 pp., illus.
2. BOYCE, JOHN S., JR. 1954. Spraying logs of oak wilt trees to reduce infection hazard. U. S. Forest Serv. Southeast. Forest Expt. Sta. Res. Note 52, 2 pp.
3. ————. 1954. Mat formation by the oak wilt fungus on felled versus standing trees. Plant Dis. Rptr. 38(9):676-677.
4. BUCHANAN, WILLIAM D. 1956. Preliminary tests indicate that the small oak barkbeetle may be a vector of the oak wilt fungus. Plant Dis. Rptr. 40(6):654.
5. CURL, E. A. 1956. Experimental transmission of Endoconidiophora fagacearum by Collembola. Plant Dis. Rptr. 40(5):455-458.
6. ENGELHARD, ARTHUR W. 1956. Influence of time of year and type of inoculum on infection of oak trees inoculated with the oak wilt fungus. Plant Dis. Rptr. 40(11):1010-1014.
7. FERGUS, CHARLES I. 1953. Mycelial mats of the oak wilt fungus. Pennsylvania Agric. Expt. Sta., Prog. Rpt. 100, 8 pp., illus.
8. GRISWOLD, CHARLES L. 1953. Transmission of the oak wilt fungus by the pomace fly. Jour. Econ. Ent. 46(6):1099-1100.
9. HENRY, BERCH W., C. S. MOSES, C. AUDREY RICHARDS, and A. J. RIKER. 1944. Oak wilt: its significance, symptoms, and cause. Phytopath. 44(7):636-647.
10. JEFFERY, ARTHUR R. 1953. The relation of oak wounds made during spring wood formation to transmission of oak wilt. Plant Dis. Rptr. 37(11):568.
11. JEWELL, FREDERICK F. 1956. Insect transmission of oak wilt. Phytopath. 46(5): 244-257.
12. KUNTZ, J. E., and A. J. RIKER. 1950. Root grafts as a possible means of local transmission of oak wilt. [Abstract.] Phytopath. 40(1):16-17.
13. MCMULLEN, L. H., C. R. DRAKE, R. D. SHENEFELT, and J. E. KUNTZ. 1955. Long distance transmission of oak wilt in Wisconsin. Plant Dis. Rptr. 39(1):51-53.
14. NORRIS, DALE M., JR. 1955. Natural spread of Endoconidiophora fagacearum Bretz to wounded red oaks in Iowa. Plant Dis. Rptr. 39(3): 249-253.
15. STAMBAUGH, W. J., C. L. FERGUS, F. C. CRAIGHEAD, and H. E. THOMPSON. 1955. Viable spores of Endoconidiophora fagacearum from bark and wood-boring beetles. Plant Dis. Rptr. 39(11):867-871.
16. TRUE, R. P., T. M. JUDY, and ELDON ROSS. 1955. The absorption of solutions through the tops of freshly cut oak stumps. West Virginia Univ. Agric. Expt. Sta. Current Rpt. 11, 7 pp., illus.

Accrediting Standards for Professional School Libraries

Caroline Paddock, forestry librarian at the Louisiana Polytechnic Institute, has completed a study with the title "Accreditation Standards for the Libraries of Professional Schools."

The paper is the report of a comparative study of the library standards of 22 recognized agencies which accredit professional schools. (Standards of regional agencies are not included.) The Society of American Foresters is one of the agencies involved in the investigation, the purpose of which was to determine the place of the library in the accreditation picture.

Pertinent materials supplied the author by the accrediting agencies, including statements of criteria, manuals of interpretation, schedules and questionnaires, were carefully examined, and the specific requirements of each pertaining to the library were isolated and categorized. The resulting analysis, illustrated by a series of charts, covers the requirements of the individual agencies in the areas of (1) library holdings, (2) use of the library, (3) quarters, (4) staff, (5) financial support, (6) hours observed, and (7) administrative organization.

The report begins with a brief history of the accrediting movement and a discussion of the activities (as of 1953) of the National Commission on Accrediting, and ends with an annotated bibliography covering (1) references on the accrediting movement, and (2) a list of the standard publications, by professional field, which form the basis of the study.

A set of microcards for the study (ACRL Microcard Series 81) may be obtained from the University of Rochester Press, Rochester, N. Y. A microfilm copy of the paper may be obtained from the University of California Library at Berkeley.

California Black Oak — Its Management and Economic Possibilities

Milton B. Edwards
Woodland conservationist,
Soil Conservation Service,
Auburn, California

CALIFORNIA BLACK OAK (*Quercus kelloggii* Newb.) is a large oak of the red oak group, which grows in good stands from central Oregon, south through California to the Mexican border. Practically every publication describing it lists its principal use as fuel. The wood however, which has closed pores like white oak, has been used for the manufacture of furniture and flooring on a small, noncommercial scale for many years. The Forest Products Laboratory, Madison, Wisconsin (*3*) indicates that it should be very desirable for these uses. The California Forest and Range Experiment Station has published air drying procedures and kiln schedules for this species (*5*), and has developed board foot and cubic foot volume tables for it (*2*).

If its use increases, as it probably will in this region where the hardwood supply is limited, we will need some silvicultural and management principles for guides in increasing growth rates and improving stand quality.

The purpose of this paper is to set down some of the things the author and other foresters have observed regarding this species while working with farmers on woodland conservation problems in California. We believe our observations will help others do a better job of managing and utilizing California black oak.

Tolerance

California black oak is definitely intolerant throughout most of its life. It is less tolerant than ponderosa pine (*Pinus ponderosa* Laws.), with which it is associated, but not much less. Ponderosa pine can establish itself in the shade of black oak and eventually grow up through it to overtop it. Very wolfy individuals often cause distortion and broom tops in the pine, but the pine can usually maintain itself until the oak dies. Douglas-fir (*Pseudotsuga menziesii* Mirb.) can grow up through the oak with little trouble. At low elevations, the oak serves as a very good nurse tree for the pine and on exposed slopes often the only place where pine reproduction can be found is in the shade of the oaks. The oak, however, does establish itself under the partial shade of a pine stand and remains there for years, growing little or not at all, until some catastrophe, such as fire, overtakes the pine. The sprouts then surge ahead and form a pure stand of oak, and the process starts over again. It never grows up through a stand of pine.

Black oak is more tolerant than the brush species with which it is associated, mainly the manzanitas (*Arctostaphylos* spp.), wedgeleaf ceanothus (*Ceanothus cuneatus*), and sweet birch (*Ceanothus integerrimus*). It can establish itself in their shade, grow up through them, overtop them, and finally kill them by shading.

Reproduction

California black oak reproduces from seed and from sprouts. Good seed crops may not occur every year, but some seed is produced almost every year. The large acorns provide important feed for rodents, birds, deer, and livestock.

Squirrels and birds distribute the acorns. Other rodents probably assist with the distribution. Western gray squirrels and various species

FIG. 1.—A fine specimen California black oak near Nevada City, California. 2½ logs to the first limb with the equivalent of 4½ additional logs.

FIG. 2.- When large trees are fire killed, several sprouts of about equal size start from the stump.

of ground squirrels have been observed burying acorns in shallow holes in the fall of the year at random spacing over the hillsides. The acorns are probably located by smell later, but many are never retrieved and a good crop of seedlings results in areas at rather great distances from seed trees.

Blue jays and woodpeckers also store acorns and undoubtedly many are dropped while being transported. The author recently observed a Steller jay that had perched in the top of a patch of wedgeleaf ceanothus accidentally drop an acorn that had been carried that far. It made a feeble effort to find it but gave up shortly and went off to get another. These unretrieved acorns no doubt account for much of the oak reproduction that works its way up through brush thickets.

Mirov and Kraebel (*4*) indicate that there are approximately 115 seeds per pound with a germination capacity of 95 percent.

Sprouting is profuse after cutting or fire, but old stands that have been killed by fire do not appear to come back to such good quality stands as the original. It may be that there are not many stands of this species that are not sprout stands, although many may seem to be of seedling origin. Many stands that appear to be of seed origin may have this history. Reproduction becomes established from a few scattered survivors in a conifer stand in which the trees have grown to a diameter of less than an inch or two. The conifer stand is then destroyed by fire and so are the tops of the small oaks, but they immediately sprout and form a pure oak stand. Since the tops of the original seedlings are small, they are completely destroyed by fire and, after a few years, the resulting sprouts appear to be of seedling origin.

From scant observations, it seems that sprout reproduction from small trees tends to result finally in a single dominant stem, although several stems may start at first. Sprout reproduction from stumps of large trees usually results in a ring of many stems of equal dominance with other stems of lower importance. Some of the sprouts from large stumps originate on the stump itself and some from the root crowns. Those originating from the stump itself are more subject to stump rot than those originating from the root crowns.

Growth Habits

Growth habits vary. Some trees grow with single straight stems, almost like a conifer, while others grow with many crooked branches. Between these extremes are all combinations of forms. There is good reason to believe that the growth habits may be hereditary rather than the result of density or openness of the stand. Crooked, forked trees are found in dense thickets; and straight, single stemmed trees are found growing in the open. The reverse is true, of course.

On steep slopes, trees tend to grow perpendicular to the slope and often have a downhill bow, for some unknown reason.

In my early youth, I recall hearing woodcutters lamenting the fact that straight oaks were about gone. Since that time, I have heard pioneer residents of the central Sierra Nevada foothills tell how they, their fathers, or their neighbors cut black oak for firewood. The trees with the straightest and longest boles were the most desirable because less limbing was necessary and they were more easily split. There was also greater yield of wood as less was discarded for crook, crotches, and knots. It may be that there was a rather high percentage of straight, long boled trees in oak stands a hundred, or even fifty years ago. It certainly seems that most of the present old growth stands, which would yield high quality sawlogs, are in remote coves and canyons, probably inaccessible to the early day woodcutters.

Rate of growth can be rapid. Ring counts of as few as three rings per inch have been observed. Rate of growth, it seems, depends primarily on depth of soil and amount of rainfall. It seems to grow equally well on all types of soils within its range, with the exception of those derived from serpentines. The same conditions that result in high site for ponderosa pine apparently result in high site for California black oak. However, the growth rate in board feet per acre per year probably would be less than half that of ponderosa pine on the same site.

This species is capable of forming adventitous buds anywhere on the trunk or limbs, especially when young. It tends to produce them rather profusely when pruned if the tree is growing in the open. This also happens when a stand is thinned heavily whether it is pruned or not; or when opened up by natural mortality, such as fire, snow breakage, etc. Trunks of smooth barked, young trees will sun scald if suddenly exposed to the sun by thinning, pruning, or even by the removal of dense brush. Fire, even of very light intensity, can scald and damage the tender bark at the base of young trees, and a gentle lick of flame up the trunk can cause severe scarring.

Diseases

Not much is known of the killing diseases. Oak root fungus (*Armillaria mellea*) attacks all oaks. It is especially virulent on irrigated lands, but probably kills many wild black oaks.

Several rot-causing fungi attack it and cause culling defect. Dr. James W. Kimmey, pathologist at the California Forest and Range Experiment Station, reports that in northwestern California, *Polyporus dryadeus*, *P. dryophilus*, and *P. sulphureus* are the principal rot-causing fungi attacking live trees. *P. dryadeus* usually attacks the trunk and is distinguished by its sandstone-like core. *P. dryophilus* usually attacks the roots and is distinguished by its soft core. The common sulphur fungus (*P. sulphureus*) is readily distinguished by its brilliant yellow to orange fruiting body.

Mistletoe (*Phoradendron* spp.) infests the branches and will even-

tually cover the whole tree. It is not so much a killing agent but slows down the growth and, therefore, will be of economic importance when black oak is used commercially on a large scale.

Insects

Like diseases, there is only general knowledge of the insects that attack California black oak. Many kinds of insects eat the leaves, sting the twigs, tunnel out the acorns, and bore into the wood.

Doan, Van Dyke, Chamberlain, and Burke, (*1*) in their text book, *Forest Insects*, specially mention the larvae of the acorn moth (*Melissopus latiferreanus*) as attacking the acorns and the California gall wasp (*Andricus californicus*) as causing galls on the twigs by stinging.

Effects of Fire

To the unpracticed eye and the unthinking or unknowing individual, a moderately hot fire (if there is such a thing) appears to do little damage to a black oak stand, and light fire none. Close observation shows, however, that any fire damages a stand of this species. A light winter ground fire, if it can travel through the stand at all, will scorch the stems of young trees and make wounds for rot-causing fungi to enter. Although a moderately hot fire may not kill any trees, it scorches the roots and stems of both large and small trees, causes catfaces and fire scars which result in culling defect, causes deformities in the bole, and leaves openings to admit rot and killing diseases. A hot fire might kill every tree in the stand.

Fire has few or no beneficial effects upon a black oak stand and has many bad effects.

Black oak snags are thought by some foresters to constitute particularly grave fire hazards, and their elimination following the logging of mixed conifer stands is an important precaution.

Relations to Livestock and Wildlife

California black oak is of great importance to livestock and wildlife. The early settlers expected hogs and cattle more or less to run wild and graze the tender shoots in the spring and summer and the acorns in the fall. When high protein sources of food ran short, the livestock suffered from malnutrition but lived through on a diet principally of acorns. Calves, born after the mothers' prolonged subsistence upon acorns, sometimes were deformed and were called "acorn calves." At the present time, a diet of acorns supplemented by high protein meals such as cottinseed meal or cake, can eliminate the "acorn calf" hazard entirely.

Deer, bear, squirrels, quail, and bandtailed pigeons all feed on black oak acorns extensively. Deer browse on the tender shoots in the same manner as livestock. Squirrels, owls, raccoons, bears, wood rats, mice, woodpeckers, and all sorts of other animals and birds use hollows in these trees for dens.

The presence of this species in California forests has helped maintain wildlife numbers at a relatively high level, even under heavy hunting and predator pressure.

Economics

California black oak held a position of high economic importance until a hundred years ago. Its acorns, along with those of other oaks, were on the preferred list of food for the Indian tribes. The women gathered them in the fall of the year, pounded them to pulp in a hole in a rock, using another hand-sized rock for a pestle, then leached out the bitter tannin with boiling water. The resulting meal was said to have been both nutritious and delicious.

There are some prejudices against black oak lumber to be overcome. In the past, some has been sawed on shaky promotional schemes. Most of it was improperly seasoned and turned out to be worthless because of excessive drying defects. Eastern and southern oaks are sold through a strong organizational structure with ample advertising, and they probably will have to become much more scarce or the demand for oak lumber will have to increase somewhat before California black oak products can break into the markets on a large scale. The high retail price (ranging from $200.00 to $800.00 per thousand board feet) for eastern and southern oak sold on the West Coast, however, may induce some venturesome western operators to produce black oak lumber. For the producer who is willing to use the correct techniques and the necessary care, waiting, and advertising, there ought to be sufficient spread between producing costs and selling price to show a reasonable profit.

As several publications point out, it is excellent for fuel. The increase in the number of fireplaces built in modern homes has partly offset the switch to oil, gas, and electricty for heating; and moderate quantities of black oak are cut for this purpose. The stems of young trees also make good charcoal, and a few commercial kilns are using it. In a relatively new but small enterprise, bolts of this species are being cut into sheets on a veneer lathe. These sheets are clipped into squares and treated for use as parquet block flooring.

A large percentage of the black oak stands are privately owned, and many are in small farm ownerships. At some future date these stands will be valuable for sawlogs; but they can, at the present time be profitably managed for the production of fuelwood. This is a possible enterprise for farmers in off seasons when other work is slack. The only equipment necessary, except for saws, is that used for other farm enterprises. When markets develop for sawlogs, a fuelwood enterprise will fit in well to utilize thinnings and to salvage parts of trees too small or too defective for converting into lumber.

The grower will want the answers to several questions before making a decision regarding the growing of black oak as an enterprise. Probably the most important one is the amount of income per acre per year he can expect. He will want to compare this with the income he could expect from growing soft-

woods on the same site. If, as we have assumed, the growth rate on the same site is only half that of softwoods, the stumpage price would have to be twice as high to make it equally attractive financially. He will also want to consider the cost of converting to softwoods, if he already has a stand of black oak. He may want to maintain some stands of black oak, regardless of the difference in income potential, to round out a forest enterprise or to provide a more diversified source of income.

The difference in stumpage prices and growth rates throw all the weight in favor of growing softwoods, but the difference in stumpage prices may not exist in a few years and possibly might be reversed. We have seen many species that were considered weed species at one time gradually become quite valuable. Because of its good technical qualities, this is likely to happen in the case of black oak.

Silviculture

The conscious management of black oak growing in mixtures could be quite complicated, although mixtures of oak and conifers of various kinds are not unusual. California black oak is unique among the rather rich oak flora of California in that it is abundant well up into the mixed conifer forests of the Sierra Nevada, sometimes occurring at elevations of 5,000 feet in the central Sierra. In this respect, it differs from the more strictly woodland species of the foothills of the Sierra and the Coast Ranges. Where black oak grows in association with *Q. wislizenii* A.DC., the valley live oak, the hybrid, × *Q. morcha* Kellogg is rather commonly found. This cross between deciduous and evergreen parents is particularly conspicuous in late winter when its leaves finally yellow and gradually fall.

Ponderosa pine and black oak do equally well in identical environments, but deliberately to mix these two intolerant species would not be the best silviculture. Where both species are to be grown together, they probably should be grown in small blocks, or small blocks of one in large areas of the other.

The first job in the average stand, as it appears at present, would be an improvement cut, which might be heavy or light depending on the condition of the stand and the market for material to be cut. The goal would be to remove as much of the decadent material as possible. This would include trees with fire scars, crooked trees, trees that were heavily infested with mistletoe, bad leaners, and trees with many forks.

It appears that intensive management of pure stands will eventually be a modified system of even-aged, pure stands and clearcutting. Cutting would be done only after ample reproduction had become established. Thinning operations would be from below and would help to eliminate crooked and forked individuals and increase the percentage of straight, single stemmed, high quality and genetically superior trees. Selected trees would be pruned to one log length. Pruned trees would be the best in the stand. Normally they would be straight and single stemmed; however, if the straight, single stemmed trees were scarce or lacking, trees with moderate crooks or with one or two forks might be pruned. Trees with forks occurring at a height of seven feet or higher might be pruned up to the height of the forks. In trees with only one or two forks, all but one of the forks might be pruned off to leave a single stem. Pruned trees should be examined after a year or two and any branches that have started from adventitious buds should be removed. In low quality stands or on poor sites, the coppice system might be used to advantage.

At present there is heavy pressure on the softwood stands on all forest lands including privately owned land. After logging is completed on private lands, black oak is often the only species left to protect the soil from erosion and to aid in the conservation of water.

The ability of California black oak to sprout readily after fire helps to provide a vegetative cover and thus reduce the erosion damage that might otherwise result.

For many years, intensive management as outlined above to maintain black oak in permanent stands will not be likely. Management will be designed to produce the largest quantity of high quality material on those stands that happen to exist at the time, with the thought that they will eventually be replaced by conifers. This should not be accepted as an absolute statement, however, for black oak may some day be the most valuable crop that can be grown on some sites.

Summary

California black oak is a large oak of the red oak group. It has been used for little else but fuel but has good qualities for flooring and furniture. It is intolerant but serves as a nurse tree for desirable conifers and when young, can establish itself under the brush species with which it is associated. It reproduces well from seeds, but many stands which appear to be of seed origin, actually may be of sprout origin from very young trees killed by fire. Squirrels and birds probably spread the seeds over considerable areas.

Growth habits vary. Form varies from straight, single stems to many crooked stems. On steep slopes, it tends to grow perpendicular to the slope with a downhill bow. On good sites, growth is rapid. Adventitious buds form on young stems when thinned or pruned heavily or when the stand is opened up by fire or other catastrophe. Young stems scald when suddenly exposed to the sunlight.

Oak root fungus is an important killing disease and there are several rot-causing fungi that attack it. Mistletoe infests the branches and slows down the growth. Many kinds of insects attack it but few kill. Even light fire can cause considerable damage.

This species is important to livestock and wildlife for food and shelter. Early California Indians used the acorns for food.

There are prejudices to be overcome because of faulty seasoning

of some of the lumber that has been cut. The high price of eastern oak lumber should induce some operators to produce it. Some is now being peeled on veneer lathes and made into parquet blocks for flooring. Cutting should probably be a modified system of even-aged stands with thinning from below and clear cutting after seed reproduction has become established. Selected trees should be pruned. Coppice may have advantages on poor quality stands and low sites. Intensive management may not become a fact for many years, but some day this species may be the most profitable crop that can be grown on some sites.

Literature Cited

1. DOAN, VAN DYKE, CHAMBERLAIN and BULKE. 1936. Forest insects. McGraw-Hill Book Co., New York.
2. HORNIBROOK, E. M., R. W. LARSON, J. J. AKKEREN, and A. S. HASEL. 1950. Board foot and cubic foot volume tables for some California hardwoods. Forest Res. Note No. 67. California Forest and Range Expt. Sta., Berkeley.
3. MARKWARDT, L. J., and T. R. C. WILSON. 1935. Strength and related properties of woods grown in the United States. Tech. Bull. No. 479, Forest Products Laboratory, U. S. Dept. Agric., Washington, D. C.
4. MIROV, N. T. and KRAEBEL. (—) Collecting and handling seeds of wild plants. Civilian Conservation Corps. Forestry Publ. No. 5. California Forest and Range Expt. Sta., Berkeley.
5. SMITH, HARVEY H. 1949. Seasoning California black oak. Res. Note No. 62, California Forest and Range Expt. Sta., Berkeley.

Growth and Specific Gravity Responses in a Thinned Red Pine Plantation

Benson H. Paul
Forest products technologist,
Forest Products Laboratory,[1]
Forest Service,
U. S. Department of Agriculture

THINNINGS in densely stocked forest stands increase the growth rate of the remaining trees and develop trees of larger size at a given age or rotation than would result in a similar unthinned stand. A question may be raised with respect to the total cubic volume growth including wood removed in thinnings from comparable thinned and unthinned stands. One advantage of thinning, however, is the production of fewer and larger trees. This undoubtedly is well worth while in the growing of sawlog timber, but it may be less advantageous in the shorter rotations permissible for pulp and fiber products. In either case, the effect of thinning on the volume of wood and on structural characteristics

[1]Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

TABLE 1.—COMPARATIVE GROWTH AND SPECIFIC GRAVITY OF RED PINE IN UNTHINNED AND THINNED SAMPLE PLOT

Height in tree	Average data for unthinned and thinned plots	1943 Check	Check plot		Thinned plot	
			1944-1948	1949-1954	1944-1948	1949-1954
In.						
400	Number of trees sampled	20	10	10	10	10
	Number of years	6.6	5	6	5	6
	Radius (In.)	.971	.747	.544	.799	.682
	Specific gravity	.330	.322	.342	.314	.337
	Volume of 100-inch bolt (Cu. ft.)	.171	.365	.394	.398	.525
	Dry weight of 100-inch bolt (Lb.)	3.530	7.338	8.400	7.801	11.008
300	Number of years	10.1	5	6	5	6
	Radius (In.)	1.791	.583	.406	.564	.434
	Specific gravity	.326	.331	.366	.334	.374
	Volume of 100-inch bolt (Cu. ft.)	.583	.441	.380	.425	.406
	Dry weight of 100-inch bolt (Lb.)	11.863	9.118	8.688	8.860	9.472
200	Number of years	15.7	5	6	5	6
	Radius (In.)	2.262	.417	.237	.362	.359
	Specific gravity	.334	.346	.396	.364	.415
	Volume of 100-inch bolt (Cu. ft.)	.930	.375	.241	.322	.366
	Dry weight of 100-inch bolt (Lb.)	19.387	8.088	5.957	7.304	9.477
100	Number of years	25	5	6	5	6
	Radius (In.)	2.825	.316	.206	.253	.338
	Specific gravity	.336	.365	.406	.399	.424
	Volume of 100-inch bolt (Cu. ft.)	1.451	.343	.243	.272	.399
	Dry weight of 100-inch bolt (Lb.)	30.421	7.806	6.156	6.760	10.558

that affect the yield of dry substance, such as specific gravity, is of considerable importance.

The well-known Star Lake red pine (*Pinus resinosa* Ait.) plantation of the Wisconsin Conservation Department was established in 1913. When 30 years of age, two sample plots of 1 acre each were designated for study. One was thinned, and the other was held intact as a check plot. Three thinnings have been made, the last in 1954.[2] From trees removed in the 1954 thinning, samples for wood quality determinations were supplied by the Wisconsin Conservation Department to the U. S. Forest Products Laboratory for study.

Sample Material

The samples consisted of thin cross sections, about 1 inch along the grain, taken from the upper ends of 100-inch pulpwood sticks in 10 trees. Four such disks were analyzed for each tree reaching a height of 400 inches (33⅓ feet). These were tested to obtain wood characteristics before and after thinnings in 1943 and 1948. Measurements were made along an average radius of each disk, and specific gravity determinations were made on material grown before and after the first and second thinnings. Five years elapsed between the first and second thinnings and 6 years between the second and final thinnings.

Since it was not possible to cut disks from trees in the check plot, growth measurements and specific gravity determinations were made from increment cores of 10 trees taken at 100-inch height intervals in codominant and dominant trees. These corresponded to the samples from the thinned stand. The cores were supplied by the Forest Genetics Department of the University of Wisconsin.

Growth

It is of interest to examine growth in diameter at the different levels in the trees. Comparisons of the thinned and check plots were made for growth after thinnings. It is assumed that growth conditions in the two plots were similar before thinning. Therefore, for an equal basis of comparison, values for material formed before that time in the two plots have been combined and averaged for the 20 sample trees.

Following the first thinning, the average growth in diameter of the 10 trees was least at the 100-inch level and greatest at 400 inches. A similar relationship held for the same 5-year period in the 10 trees of the check plot, whose growth

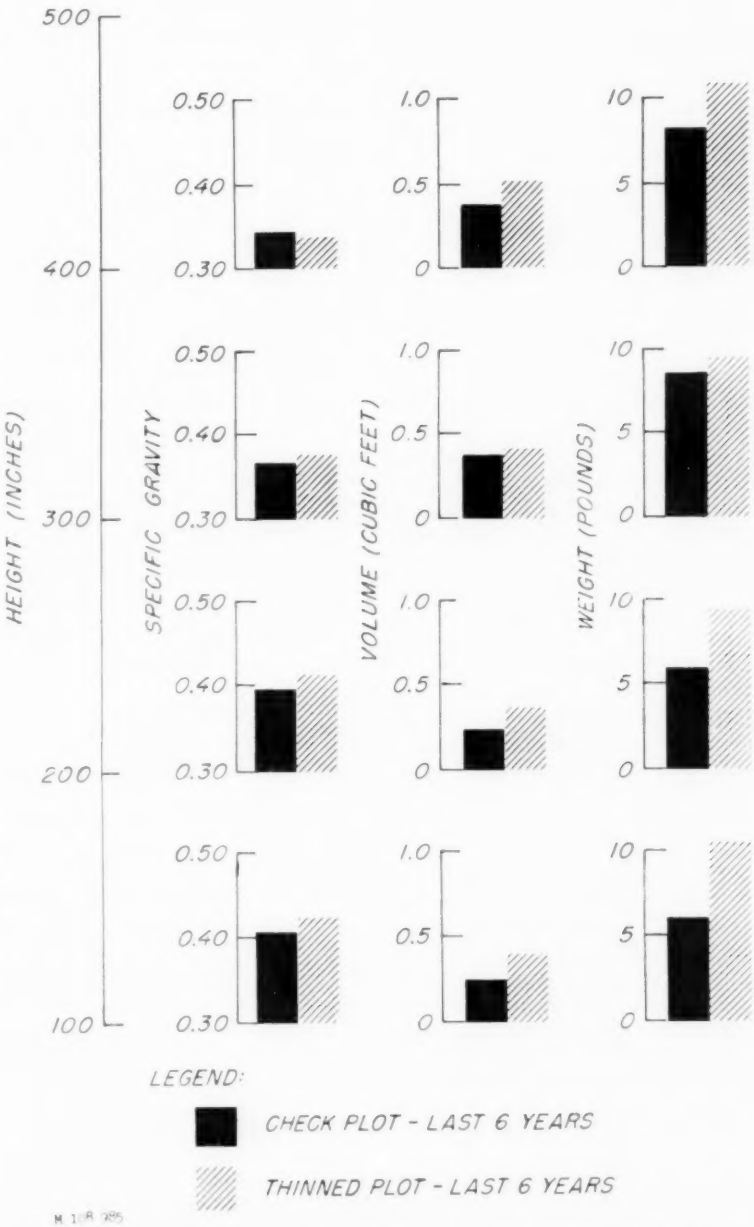


FIG. 1.—Average comparisons of specific gravity, volume growth, and weight of wood at four heights in trees from an unthinned and thinned plot in a red pine plantation.

[2] Wilson, F. G. Evaluation of three thinnings at Star Lake. Forest Sci., Vol. 1, No. 3, pp. 227-234. 1955.

slightly exceeded that of the sample trees of the thinned plot at all heights except the 400-inch level.

Following the second thinning, average radial growth increased slightly over the preceding 5-year period at the 100-inch level, but it failed to maintain the increase at the other three heights. However, on a cubic volume basis, average wood production was greater following the second thinning at all heights in the sample trees. During the same years in the check plot, radial growth of the trees averaged much less and also showed a considerable reduction in volume growth from that of the preceding 5-year period. The growth, specific gravity, and yield data corresponding to the thinning dates are presented in Table 1.

Specific Gravity

The specific gravity values for both the check plot and the thinned plot were quite similar in the overall pattern, increasing outward from the central portion of the tree and decreasing upward in the growth rings. At the 100-inch level, there was a large increase in specific gravity from the central portion toward the bark in both plots. The increase was slightly less in the check plot. At the 200- and 300-inch levels, radial increases in specific gravity outward were progressively smaller, and at the 400-inch level, the specific gravity of the three parts of the radius was quite uniform. In the thinned plot, the wood formed since the last thinning averaged slightly heavier than that formed during the same years in the unthinned plot. This increase in density or specific gravity together with the greater volume of the individual trees, gives an added advantage from thinning (Fig. 1). Considering only the wood formed since the second thinning, the average tree has a volume increase of 34.7 percent and a weight increase of 38.7 percent over the same years in the check plot. Even so, the highest specific gravity values found at the 100-inch level were still below the average value (0.44) of old-growth red pine tested at this laboratory.

It appears from this study and from data obtained from other red pine plantations[3,4] that during initial stages of growth, plantation trees spaced 6 feet or more apart tend to develop wood of relatively low density as long as the green crown persists along the length of the tree. As the green crown moves upward by loss of the lower branches through shading, there is a gradual increase in specific gravity outward that takes place first in the lower part of the bole. There was a lower proportion of springwood in the part of the growth sheath farthest away from the green crown. Apparently, the wood typical of old growth of a species forms after the boles of the trees are fairly well cleared of vigorous green branches. This preliminary stage of development can be regulated within certain limits by controlling the relative size of the crowns by spacing or by pruning of the green branches.

Yields Per Acre

The foregoing discussion was based on the average development of individual sample trees in thinned and unthinned plots. When the results are applied to all of the trees in the two sample plots under consideration, the advantage on a volume yield per acre basis alone may be less evident. Wilson[5] noted equal cubic volume yields of the check plot and thinned plot over a 41-year period when materials removed in thinnings are included. Whether the weight advantage found since the last thinning will persist is uncertain. With a reduction to 320 trees per acre in the third thinning, both growth acceleration and density increase will be necessary to equal the weight yield of the greater number of trees remaining in the check plot. However, in the future, increased loss of trees by mortality will tend to reduce the volume growth of the check plot.

An important advantage of the thinning, according to Wilson, was income from the profits of the sales of the pulpwood removed in the thinnings. The total of 1,815 cubic feet of pulpwood more than equaled the planting costs and carrying charges up to the time of the third thinning.

Summary

Growth response to thinning was slow during the first 5 years in plantation-grown red pine trees thinned at 30 years. Wider growth rings were produced only at the 400-inch height in a thinned plot.

Following a second thinning, the volume growth of individual trees during 6 years in the thinned plot showed an average increase of 34.7 percent over those of the check plot. The increase in average weight per tree was 38.7 percent during the same years.

Since specific gravity values have been increasing throughout the life of the plantation, a moderate future increase may be expected in the thinned plot, at least up to the time that the average specific gravity equals that recorded for old-growth red pine timber.

[3] Anderson, E. A. Properties of plantation-grown red pine wood. Forest Products Lab. Office Report. 1950.

[4] Paul, Benson H. Specific gravity and shrinkage of University of Wisconsin plantation red pine. Forest Products Lab. Office Report. 1955.

[5] Op. cit.

A Selected Annotated Bibliography of Aerial Photo Interpretation Keys to Forests and Other Natural Vegetation

Grover A. Choate
Forest Service,
U. S. Department of Agriculture,
Washington, D. C.

A PHOTO INTERPRETATION key has been defined and described as ". . . reference material designed to facilitate rapid and accurate identification and determination of the significance of objects or conditions from the analysis of their photo images. Ideally, the key consists of two parts: (1) a collection of annotated or captioned stereograms and other photos which are illustrative of the objects or conditions to be identified, and (2) a graphic or word description which sets forth in some systematic fashion the photo recognition features of those objects or conditions." (Colwell, 1952, listed in this bibliography).

Keys may be organized in one of two basic forms: selective keys and elimination keys. Colwell, in his 1952 report, states that selective keys are so arranged that the photo interpreter simply selects that example corresponding to the image he is trying to identify, and elimination keys are arranged so that the photo interpreter follows a prescribed step-by-step process leading to the elimination of all items except the one he is trying to identify.

The keys listed in this bibliography are principally those which have been either described in publications or have been published for general distribution. A few, especially those prepared under military auspices, were reproduced for limited distribution. No material with security classification has been listed.

Most of these keys have been developed for use in forest surveys; the remainder are intended for use in military terrain studies or general land-use surveys. A number of the keys, although prepared for one use, may be applicable to other fields.

ALLIED AIR FORCES. 1943. Vegetation study, eastern New Guinea. Directorate of Intelligence, Washington, D. C. 46 pp. (Limited distribution.)

A selective key prepared to familiarize troops with characteristics of the area's major vegetation types and to aid in recognition of these types from aerial photographs. Nine principal vegetation types are described in terms of their distribution and their appearance on vertical, oblique, and ground photographs.

CATHOLIC UNIVERSITY OF AMERICA. 1950. An experimental system of keys for the interpretation of vegetation on aerial photography. Prepared at the Arctic Institute of Catholic University, Washington, D. C. under the direction of Dr. Hugh T. O'Neill for the U. S. Navy Dept. Tech. Rept. No. 1. Mimeog. (Limited distribution.)

Elimination keys to vegetation types and species in the Chesapeake Bay area. Keys treat seasonal aspects. Illustrated with vertical stereograms (panchromatic) and oblique and ground views.

———. 1952. Preliminary keys for the interpretation of vegetation from aerial photography of the Arctic and Subarctic regions. Prepared at the Arctic Institute of Catholic University, Washington, D. C. under the direction of Dr. Hugh T. O'Neill for the U. S. Navy Dept. Tech. Rept. No. 5. Mimeog. (Limited distribution.)

Elimination keys to important vegetation types and species in four test areas:

1. Kaniapiskau River, Quebec, Canada
2. Val David, Quebec, Canada
3. Homer, Alaska
4. Eklutna-Anchorage, Alaska

Illustrated with vertical stereograms, and oblique and ground views. Photographs were almost all taken during the summer. Color and infrared, as well as panchromatic film, was used for the Val David area.

———. 1953. Investigation of methods of determining terrain conditions by interpretation of vegetation from aerial photography. Prepared at the Arctic Institute of Catholic University, Washington, D. C. under the direction of Dr. Hugh T. O'Neill for the U. S. Navy Dept. Tech. Rept. No. 6—Parts I, II, and IV. Mimeog. (Limited distribution.)

Elimination and selective keys to the vegetation types and species in:

1. Chesapeake Bay Area — Part II
2. Arctic and Subarctic regions—selected regions in Quebec and Alaska—Parts I and II
3. Near-Subarctic areas—Maine, Wisconsin, Colorado, and Pennsylvania—Parts I and IV.

Keys are illustrated with vertical stereograms, and oblique and ground views. Some keys are based on panchromatic photos, others on infrared.

CHAPMAN, V. J. 1947. The application of aerial photography to ecology as exemplified by the natural vegetation of Ceylon. Indian Forester 73(7): 287-314.

Important vegetation types are described in terms of appearance from both ground and air. Recognition features for aerial photo identification are included in type descriptions and in captions to illustrations. Types are illustrated by use of vertical photographs (mostly stereopairs) at scales of 1:7,200 to 1:9,000. The textual descriptions together with illustrations constitute a selective key.

CHASE, C. D. 1947. Key to forest types in the vicinity of Lansing, Michigan when using panchromatic 1:20,000 photos taken in June and September. U. S. Forest Service, Lake States Forest Expt. Sta. [St. Paul, Minn.] 2 pp. Mimeog.

An elimination key to principal forest types in the area. Not illustrated.

——— and J. R. KOROTEV. 1947. Key to forest types in Marinette County, Wisconsin on infrared

with minus-blue filter at 1:12,000 (autumn pictures). U. S. Forest Service, Lake States Forest Expt. Sta. [St. Paul, Minn.] 2 pp. Mimeog.

An elimination-selective key used to identify forest and other types of natural vegetation. Not illustrated.

COLWELL, ROBERT N. 1946. The estimation of ground conditions from aerial photographic interpretation of vegetation types. Photogrammetric Engineering 12(12):151-161.

Discusses the usefulness of knowledge of the ecological site requirements of vegetation species or types when determining terrain conditions from aerial photographs. Includes an elimination key to vegetation types in the tropical Pacific area. Illustrations accompanying the original key (see U. S. Navy Department. 1945) are not included.

———. 1952. Report of Commission VII (photographic interpretation) to the International Society of Photogrammetry (Part 1). Photogrammetric Engineering 18 (3):375-400.

A report on progress in the field of photo interpretation, including definitions, descriptions, and examples of various forms of keys.

LOSEE, S. T. B. 1942. Air photographs and forest sites. Forestry Chronicle 18(3):129-144 and (4): 169-181.

Application of aerial photographs to mapping of sites, including illustrated elimination keys to certain site types. Keys are applicable to local Canadian areas in Ontario, Saskatchewan, and Quebec.

MOESSNER, KARL E. 1948. Forest stand-size keys for photo interpreters. Jour. Forestry 46:107-109.

Description of a selective key used by the Forest Survey in the Central States. The key consists of a series of stereograms (1:20,000, panchromatic) with accompanying average measurements of tree height, crown width, and stand density.

———. 1949. Stereograms illustrating forest sites. U. S. Forest Service, Central States Forest Expt. Sta., Columbus 15, Ohio, Miscellaneous Release No. 4. 21 pp.

A selective key to seven broad site classes in the Central States. Each class is described briefly and is illustrated by an annotated stereogram (1:15,800, panchromatic). Vegetation, topography, and soils are used as recognition features.

RAUP, H. M. and C. S. DENNY. 1950. Photo interpretation of the terrain along the southern part of the Alaska Highway. U. S. Geological Survey Bulletin 963-D.

This military terrain study includes an elimination key to vegetation. The key is based on recognition features discernible on vertical photographs. Stereograms illustrate vegetation types.

RYKER, H. C. 1933. Aerial photography—method of determining timber species. The Timberman 34(5): 11-17.

Identifications of sugar pine, ponderosa pine, Douglas-fir, and incense cedar, which may be used as a selective key. Describes the appearance of trees of each species from both ground and air. Includes ground photographs and sketches.

SCHULTE, O. W. 1951. The use of panchromatic, infrared and color aerial photography in the study of plant distribution. Photogrammetric Engineering 17(5):688-714.

Two illustrated elimination keys are used to identify seven tree species common in the area of Val David, Quebec, Canada. One key is based on panchromatic and color photographs, the other on infrared. Scales are 1:7,200.

SIMONTACCHI, ALEXANDER, GROVER A. CHOATE, and DAVID A. BERNSTEIN. 1955. Considerations in the preparation of keys to natural vegetation. Photogrammetric Engineering 21 (4): 582-588.

Keys to natural vegetation are discussed in terms of objectives and manner of presentation. Several keys are reviewed from the standpoint of presentation. The problem of terminology and consideration of the reproduction process are also treated.

SPURR, STEPHEN H. 1948. Aerial photographs in forestry. Ronald Press, New York. 176-179.

Illustrated description of stereogram record cards prepared at the Harvard Forest for softwood stands in eastern Maine. Each card contains a stereogram (1:15,840, modified infrared) and a summary of pertinent ground information.

STEIGERWALD, EDWARD F. 1950. Stereotypes for aerial photo interpreters. Jour. Forestry 48:693-696.

Description of unpublished stereotype cards used to illustrate the principal forest types and condition classes of Wisconsin. Each card in this selective key includes a vertical stereopair (1:15,840, modified infrared), a ground stereopair, and a table of sample plot data.

STOECKELER, ERNEST G. 1952. Trees of interior Alaska — Their significance as soil and permafrost indicators. U. S. Dept. of the Army, Corps of Engineers, St. Paul [Minn.] Dist. 22 pp.

Identifications of eight tree species which serve as a selective key. Gives recognition features used for ground and aerial photo identification. Illustrated with ground, oblique, and vertical photographs.

STONE, K. H. 1948. Aerial photographic interpretation of natural vegetation in the Anchorage area, Alaska. Geographical Review 38: 465-474.

A selective key to seven vegetation types. A list of recognition features and a vertical stereogram are provided for each type. This key was developed in connection with a land-classification survey.

UNIVERSITY OF OKLAHOMA. 1950. Boreal fringe areas of marsh and swampland. Tech. Rept. Nos. 2 and 3. Prepared at the University of Oklahoma Research Institute [Norman, Okla.] under the direction of John W. Morris by Merle P. Meyer for the U. S. Navy. No. 2—100 pp.; No. 3—87 pp. Mimeog. (Limited distribution.)

Technical Report No. 2 is a photo identification key (elimination type) for the summer (foliage) season in four representative areas of northern Minnesota. Ground and vertical photographs are used to identify important vegetation types in each of the four areas. Photographs were made with various types of film and were taken at different scales.

Technical Report No. 3 is a photo-identification key for the winter (non-foliage) season. Organization of this key is similar to that of Report No. 2, and the same areas are covered. Photographs were made with panchromatic film with minus-blue filter; scales are at 1:7,500.

U. S. AIR FORCE. 1949. Aerial photographic interpretation of Alaskan soils. Directorate of Intelligence, Washington, D. C. 295 pp. (Limited distribution.)

A selective key to important vegetation species and types. Soil characteristics are deduced from the presence of the species and types native to the various environments. Vegetation is discussed further from

the standpoint of relationship to permafrost and glacial ice, and also in terms of plant succession and lake obliteration. Illustrated with vertical, oblique, and ground photographs.

U. S. DEPARTMENT OF AGRICULTURE. 1947. Stereograms of sample forest condition classes in the Lake States area (modified infrared photography) U. S. Forest Service, Region 9 [Milwaukee, Wis.].

A set of 52 photographically reproduced cards illustrating forest types and condition classes recognized in management plan surveys of national forests. Each card contains a vertical stereogram (1:15,840) with notations indicating cover type, density, size class, and average height.

U. S. NAVY DEPARTMENT. 1945. Pacific landforms and vegetation. Photographic Intelligence Center, Washington, D. C. Rept. No. 7. 116 pp. (Limited distribution.)

Elimination keys, with vertical, oblique, and ground photographs, used to identify vegetation types of the Pacific Ocean area.

U. S. WAR DEPARTMENT. 1944. Photo interpretation of vegetation in the tropical Pacific area, and its use as an indicator of the kind of ground. Corps of Engineers, Engineer. Notes No. 20. Prepared by U. S. Geological Survey, Washington, D. C. 115 pp. (Limited distribution.)

An illustrated selective key to important vegetation types which includes descriptions of types and of terrain conditions. Emphasizes the effect of vegetation and terrain on military operations.

YUAN, H. C. 1955. Key for the photo identification of natural forest types and bamboo species in Taiwan. Joint Committee on Rural Reconstruction [Taipei, Formosa]. 2 pp. Mimeog.

An elimination key developed in connection with the Taiwan land use and forest resource survey. Not illustrated.

Some Observations of an Undescribed Disease of Ponderosa Pine Twigs

Leon I. Cohen and Charles W. Waters
Respectively, pathologist, and professor of forest pathology, Montana State University, Missoula

IN VIEW OF the rapidity with which introduced diseases have spread in this country, often with devastating losses, any sign of a "new" disease should be regarded with more than casual interest. Recently, attention was called to an isolated ponderosa pine (*Pinus ponderosa* Laws.) near Missoula, Montana, which, from a distance, appeared to bear an unusual number of cones. Closer inspection showed branches with galls (Fig. 1). After another tree containing similar galls was found growing a short distance from the first, it was felt that this anomaly warranted investigation.[1]

The general appearance of the galls, *in situ*, was noted and several were preserved in F.A.A. solution for study in the laboratory. For anatomical study, a modification of a method outlined by Colley (*1*) was used. Transverse, radial, and tangential sections were cut from tissue at the base of the gall, sectioned on a freezing microtome at

[1]Re-examination of the area during the summer of 1956, showed the initial appearance of galls on a tree in the immediate vicinity of those originally reported. The disease has now been found in another area, north of Missoula.

FIG. 1.—Typical appearance of galls on lower crown.

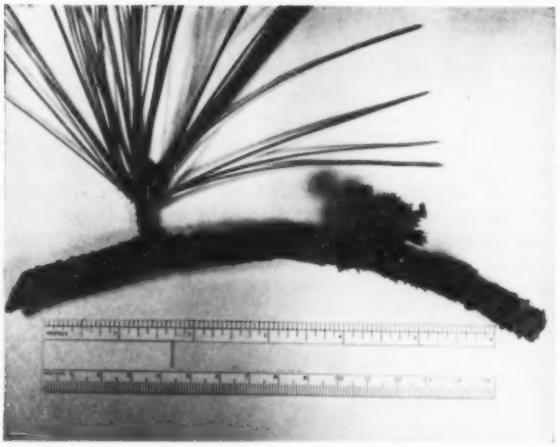


FIG. 2.—Proliferating buds of a young gall. Lateral shoot, left, illustrates normal shoot and needle development.

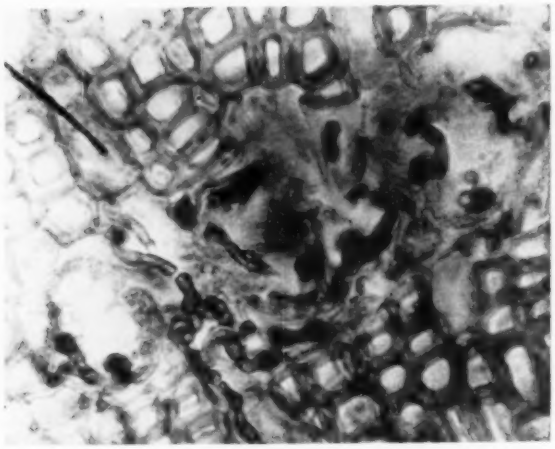


FIG. 3.—Photomicrograph of transverse section through base of gall showing dark, septate hyphae associated with xylary resin canals and ray parenchyma.

20 to 30 microns, and stained with safranin and fast green.

Morphology

Galls were most abundant on secondary and tertiary branches on the lower half of the crown. Although there was no evidence of twig mortality on secondary branches, twigs containing galls had an open, tufty appearance due to needle retention restricted at the branch tip and failure of the lateral buds to elongate and produce needles in a normal manner. Tertiary branches, however, showed a definite decline in vigor, and dead twigs containing small galls were common. It is evident that galls reduce the needle bearing surface which may affect the annual, radial growth of the tree.

A gall consists of a compact aggregate of proliferating buds growing from a short, stout, stalk-like branch invariably formed at a node near the scars of the terminal bud scales (Fig. 2). They range in size up to 3 and 4 inches in diameter. The larger galls were usually dead and dry, the smaller consisting mostly of live shoots and bud tissue. Further examination under the binocular dissecting microscope revealed several exoskeletons of insects identified as a non-gall-forming caterpillar in the genus Diocytria. Insect pellets were abundant at the base of the galls and in excavated tunnels within the shoot axes. The primary agent causing the galls was not determined.

Stained sections of tissue from individual bud axes showed dark, septate hyphae in the cortex, pith, and xylem of the host. The hyphae, which measured from 3 to 5 microns in diameter, were scattered through the cortical parenchyma and resin canals. Hyphae growing in the xylem was almost entirely restricted to the ray parenchyma and epithelial cells lining resin canals (Fig. 3). From transverse sections, ends of hyphae could be seen within tracheids in the vicinity of infected rays. Xylem, in tangential and radial view, showed corrosion of the inner tracheidal walls with rod-like protuberances projecting into the lumen. In many instances, the xylem cylinder was in a state of advanced decay or completely destroyed. Decay, extending beyond the gall, was also evident in some larger branches.

Discussion

Because of inadequate evidence, we are not prepared to attribute gall formation to a particular organism. However, by comparing seasonal activity of normal shoot apices of ponderosa pine (*3*) with that of abnormal shoots, we can speculate on the probable mechanism involved in gall formation.

Winter buds are compound, telescoped structures containing all the primordia of the next season's growth. Following winter dormancy, there is initiated a period of bud expansion. In a healthy shoot, this involves internodal elongation of the shoot axis. Coincident with this, dwarf shoots or strobili, or lateral vegetative buds resume growth. During the first three to four weeks of bud elongation, the shoot apex exhibits no visible evidence of activity. Only after the buds have expanded considerably and the needles, borne on the dwarf shoots, have elongated and perforated the fascicle scales does the shoot apex assume mitotic activity.

By comparison, the aberrant shoot producing galls also undergoes bud expansion, i.e., internodal elongation, but to a limited extent. There is no evidence of needle elongation or needle formation. Since apical growth depends also on needle formation, there is no resumption of mitotic activity in the apical meristem.

As early as 1837, Henry (*2*) recognized that the dwarf shoots of Pinus possessed the latent ability to proliferate into long shoots. Recent studies by Sacher (*4*) have shown no fundamental differences between apices of dwarf and long shoots of Pinus. In postulating the mechanism involved in gall formation, it is assumed that the forma-

tion of needle primordia of the dwarf shoot is inhibited and, where the apical meristem of the dwarf shoot remains active, it can develop into a long shoot, i.e., a lateral vegetative bud. Subsequently formed lateral vegetative buds on the aberrant shoot develop in a similar manner to form a gall.

Thus far, galls due to abnormal proliferation of buds have been found only on several ponderosa pine in the vicinity of Missoula, Montana. Because of its rarity, the damage caused by the disease is of no economic importance. Further investigation is not contemplated at this time beyond continued vigilance regarding spread and occurence elsewhere.

Summary

Galls growing on ponderosa pine twigs near Missoula, Montana were examined and described. Anatomical studies revealed dark, septate hyphae growing in the cortex, pith, and xylem of the host. In several instances the xylem cylinder was in a state of advanced decay or was completely destroyed, with decay often extending to larger branches. The formation of galls could not be attributed to a particular organism. By comparing the development of normal ponderosa pine shoots with diseased ones, the probable mechanism involved in gall formation was discussed.

Literature Cited

1. COLLEY, R. H. 1917. Diagnosing white-pine blister-rust from its mycelium. Jour. Agric. Res. 6:281-286.
2. HENRY, A. 1837. Beitrag zur Kenntniss der Laubknopsen. Nova Acta Leop.-Carol. Akad. Naturf. Verh. 19: 87-114.
3. SACHER, J. A. 1954. Structure and seasonal activity of the shoot apices of *Pinus lambertiana* and *Pinus ponderosa*. Amer. Jour. Bot. 41:749-759.
4. ———. 1955. Dwarf shoot ontogeny in *Pinus lambertiana*. Amer. Jour. Bot. 42:784-792.

SECTION BOX SCORE 1957 MEMBERSHIP

Section	Applications received[1] July 1957	Total 1956	Total 1957
Allegheny	1	58	61
Appalachian	0	58	15
Central Rocky Mountain	2	32	21
Central States	0	42	11
Columbia River	7	77	51
Gulf States	1	79	40
Inland Empire	9	32	12
Intermountain	0	35	5
Kentucky-Tennessee	0	12	5
New England	7	61	35
New York	1	45	33
Northern California	2	67	17
Northern Rocky Mountain	0	31	45
Ozark	3	19	54
Puget Sound	5	44	41
Southeastern	1	92	96
Southern California	0	2	2
Southwestern	3	2	5
Upper-Mississippi Valley	3	72	48
Washington	0	1	10
Wisconsin-Michigan	1	102	28
Total	46	963	635

[1]Student, Junior, Affiliate, Associate (Initial) grades only.

SCHOOL BOX SCORE 1957 MEMBERSHIP

School	Student applications received July 1957	Total 1956	Total 1957
Alabama Polytechnic Institute	0	6	19
University of California	0	53	10
Colorado State University	2	28	16
Duke University	0	7	3
University of Florida	0	25	5
University of Georgia	0	30	56
University of Idaho	9	21	12
Iowa State College	3	31	17
Louisiana Polytechnic Institute	0	27	1
Louisiana State University	0	22	19
University of Maine	6	13	17
University of Massachusetts	0	20	2
Michigan State University	0	50	9
University of Michigan	1	24	8
University of Minnesota	0	26	27
University of Missouri	0	2	36
Montana State University	0	17	43
State University of New York	1	38	24
North Carolina State College	0	24	1
Oregon State College	5	44	27
Pennsylvania State University	0	35	29
Purdue University	0	36	2
Utah State University	0	28	5
University of Washington	0	21	15
West Virginia University	0	5	19
Yale University	0	13	5
Total	27	646	427

Early Responses of Some Southern Tree Species to Gibberellic Acid

Thomas C. Nelson
Forester, Athens-Macon Research Center,
Southeastern Forest Experiment Station,
Forest Service,
U. S. Department of Agriculture

GIBBERELLIC ACID is a metabolic product of the fungus, *Gibberella fujikuroi* (Sav.) Wr., which is the cause of the "Bakanae" (or "foolish seedling") disease of rice in Japan and other countries of the Far East. A characteristic early symptom of the disease is shoot elongation so that diseased plants are much taller than healthy ones.

As early as 1926, Kurosawa, as quoted by Brian et al. (*1*), showed that symptoms of shoot overgrowth could be induced in rice seedlings by applying cell-free filtrates from liquid cultures of *G. fujikuroi* to the roots. By 1934, Kurosawa and other Japanese workers had established the following facts about the effects of this fungus on the growth of plants:

1. Though overgrowth of shoots was produced by culture filtrates, growth of roots was unaffected.

2. Not only rice, but other monocotyledons and dicotyledons, responded by increased shoot growth.

3. The increased height of plants was sometimes associated with an increase in dry weight, although more frequently dry weight was unaffected.

By 1939, Yabuta and Hayashi (*5*) had isolated two growth-stimulating gibberellin compounds. Almost simultaneously, Curtis and Cross (*2*) of Imperial Chemical Industries, England, isolated gibberellic acid ($C_{19}H_{22}O_6$) and Stodola et al. (*4*) perfected a method for the production of crude crystalline gibberellin. Yields of about 12 grams of gibberellin per 160 gallons of liquid culture are commonly obtained, but higher yields are possible by improvements in fermentation processes (*6*).

Early tests of gibberellic acid on forest tree species were made by Marth, Audia, and Mitchell (*3*) at the U. S. Department of Agriculture, Agricultural Research Center, Beltsville, Maryland. They showed increased growth of stems of forest tree species up to 200 percent.

Present Study[1]

Thirty individuals of each of 11 species were potted in No. 10 cans in the fall of 1956 and placed in the greenhouse in early December under a 16-hour photoperiod. One-year-old seedlings were used except in the case of white oak (*Quercus alba* L.) seedlings, which were newly germinated, and eastern cottonwood (*Populus deltoides* Bartr.) and American sycamore (*Platanus occidentalis* L.), which grew from cuttings.

As the terminal buds opened, a 1 percent solution of gibberellic acid[2] (approximately the amount which could be held on the small end of a toothpick) was applied to the new shoot growth. As plants broke dormancy, every other individual of each species was treated until 16 individuals had broken dormancy. Pots were arranged in eight replicates, each containing one treated and one untreated individual of each species which broke dormancy at or close to the same time.

Treatments were applied without wounding to the oaks, other than white oak. It was found that the growing tips of the oak species were extremely sensitive and that wounding caused permanent damage. Yellow-poplar (*Liriodendron tulipifera*. L.) and sweetgum (*Liquidambar styraciflua* L.) were also treated without wounds to the stem tissue. The remaining species were nicked with a knife and gibberellic acid in lanolin applied around the entire stem at that point.

Discussion

Growth conditions in this study were not natural or ideal. Pots were watered at intervals that were optimum for the majority of the species. For fast growing cottonwood, this schedule was less often than desired. Treated individuals of all species showed less tendency to wilt under soil moisture stresses than the untreated individuals.

Treated individuals of eastern cottonwood, American sycamore, yellow-poplar, sweetgum, cherry-bark oak (*Quercus falcata* var. *pagodaefolia* Ell.), willow oak (*Quercus phellos* L.), and southern red oak (*Quercus falcata* Michx.) made significantly greater height growth than the checks (Table 1 and Fig. 1). Treated white oak and eastern white pine (*Pinus strobus* L.) had increases in height growth that approached the 5-percent level of significance. There was no increase in height growth due to treatment of Arizona cypress (*Cupressus arizonica* Greene) and water oak (*Quercus nigra* L.). No spindling weakened stems developed such as is often typical of an etiolated condition.

Eastern cottonwood showed very consistent increases in height growth due to treatment. The effect of treatment maintained itself throughout the course of the study. A number of treated individuals grew over 30 inches in height in a 2½ month period.

American sycamore also showed excellent response to gibberellic acid. However, at 23 days, the

[1] In cooperation with the School of Forestry, University of Georgia.

[2] Gibberellic acid furnished through courtesy of Merck & Co., Rahway, New Jersey.

TABLE 1.—AVERAGE DIFFERENCE IN STEM GROWTH BETWEEN TREATED AND UNTREATED STEMS OF 11 HARDWOOD SPECIES

Species	Average period of observation following treatment	Average difference in stem growth				Increase due to treatment on date of greatest difference		
		Jan. 28	Feb. 5	Feb. 14	Feb. 25	Treated	Untreated	Increase
	Days	*Inches*						*Percent*
White oak	58	1.69	1.00	1.66	1.75	5.45	3.70	47
Arizona cypress	70	(1)	(1)	(1)	(1)	6.86	7.30	-6
Eastern cottonwood	53	9.62	9.47	11.67	12.25	28.50	16.25	75
American sycamore	23	8.68	13.25	(2)	(2)	17.00	3.75	353
Yellow-poplar	35	1.63	2.07	3.21	4.25	9.69	5.44	78
Eastern white pine	42	1.00	1.39	1.43	2.50	6.38	3.88	64
Sweetgum	35	1.00	1.86	2.59	3.19	5.56	2.38	134
Cherrybark oak	41	1.56	2.33	2.38	1.91	4.69	2.31	103
Water oak	43	1.74	0.18	1.13	0.00	5.12	3.38	51
Willow oak	38	1.00	2.40	2.44	1.62	4.25	1.81	135
Southern red oak	39	3.12	2.29	2.19	1.75	5.06	1.94	161

[1]Untreated trees grew slightly faster than treated trees.
[2]Sycamore leaders were damaged by unknown cause.

growing points were damaged by an unknown cause. A new series of items was treated as the remaining cuttings broke dormancy. The second series of treatments showed height-growth increases that were of the same magnitude as those in the first series.

Yellow-poplar and sweetgum continued to show increasing differences in height growth between treated and untreated series at the end of 35 days. Not only was terminal growth greater but more total leaf surface developed on the treated individuals. The best results with both species were obtained by treating new stem growth after the first internode had commenced elongating.

Cherrybark oak, willow oak, and southern red oak showed their most pronounced response to treatment immediately following the first flush of growth. As the second flush of terminal growth commenced, the differences due to treatment diminshed. However, comparisons were difficult to make after the first flush was completed because of unevenness in initiating terminal growth in subsequent growing periods. There were also distinct differences in leaf shape, rate of leaf development, and leaf color between the treated and un-

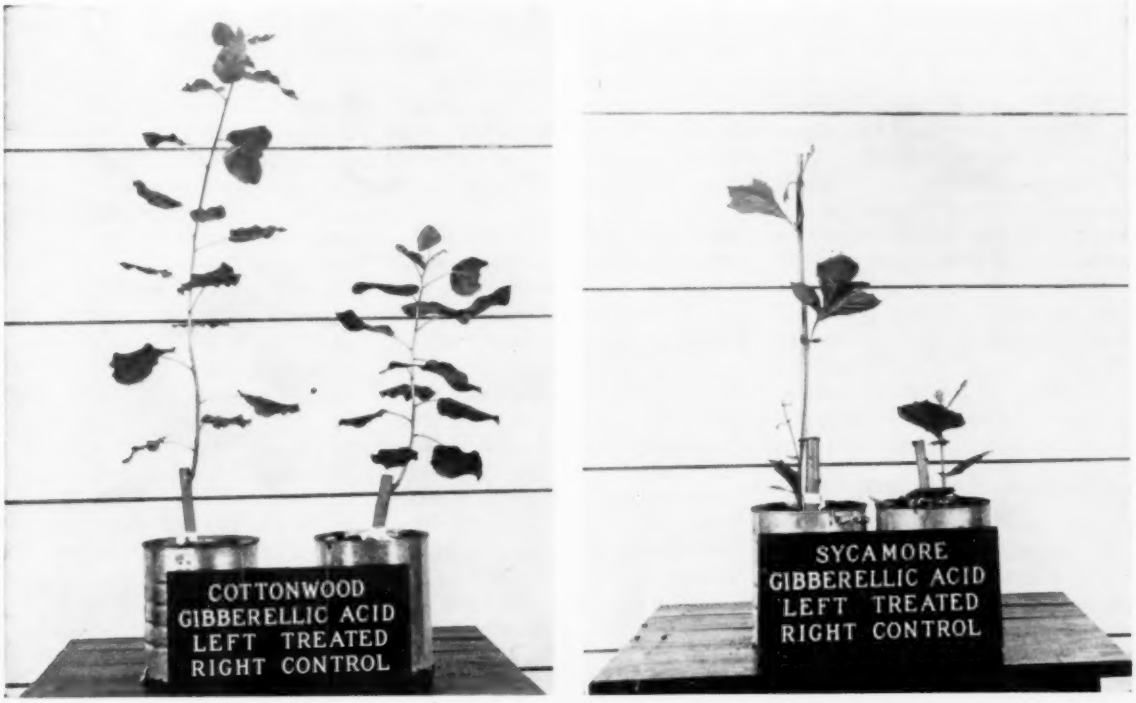


FIG. 1.—Comparison of stems treated with 1 percent gibberellic acid in lanolin and checks of cottonwood and sycamore. Horizontal black lines are 12 inches apart.

treated individuals of these three species. The treated stems usually leafed out sooner and had larger leaves with more pronounced venation. There was usually a difference in sinus shape and depth, the treated individuals producing leaves which more closely resembled adult leaves of the species. The terminal bud of most of the oaks formed on a partially elongated internode, giving the stem an unusual appearance at the end of the first flush of growth.

Response to treatment, other than height growth, was less pronounced on white pine than on white oak in that there were no needle aberrations on the pine, whereas leaves of the oak group showed abnormalities. Marth et al. (*3*), using the same treatment applied in this study, also report no effect on eastern white pine.

Arizona cypress showed no increases in growth caused by treatment. In fact, the treated individuals had slightly less height growth than the untreated stems; a chlorosis was noted in the area of application.

Although water oak did not show significant increases in height growth after the treatment, it did exhibit changes in leaf shape and size much like those of other species of Quercus. Treated water oaks showed earlier leaf development than untreated individuals. Several of the water oaks also showed terminal stem damage due to treatment.

Summary

A 1-percent solution of gibberellic acid in lanolin was applied to young stems of 11 southern tree species. Treatment significantly increased height growth of eastern cottonwood, American sycamore, yellow-poplar, sweetgum, cherrybark oak, willow oak, and southern red oak, from 75 to 353 percent. White oak and eastern white pine had less clearcut increases in height growth. Arizona cypress and water oak exhibited no consistent increase as a result of treatment.

Literature Cited

1. BRIAN, P. W., G. W. ELSON, H. G. HEMMING, and M. RADLEY. 1954. The plant-growth-promoting properties of gibberellic acid, a metabolic product of the fungus *Gibberella fujikuroi*. Jour. Sci. Food Agr. 5: 602-612.
2. CURTIS, P. J., and B. E. CROSS. 1954. Gibberellic acid, a new metabolite from the cultural filtrates of *Gibberella fujikuroi*. Chem. and Indus. P. 1066.
3. MARTH, P. C., W. V. AUDIA, and J. W. Mitchell, 1956. Gibberellic acid—a plant regulator. Hort. Crops. Research Branch, ARS, USDA, Beltsville, Md., 8 pp. mimeo. Sept.
4. STODOLA, F. H., K. B. ROPER, D. I. FENNELL, H. F. CONWAY, V. E. SOHNS, C. T. LANGFORD, and R. W. JACKSON. 1955. The microbiological production of gibberellins A and X. Arch. Biochem. and Biophys. 54:240-245.
5. YABUTA, T., and T. HAYASI. 1939. Biochemical studies on "bakanae" fungus of rice. II. isolation of gibberellin, the active principle which produces slender rice seedlings. Jour. Agr. Chem. Soc. Japan 15:257-266.
6. ———. 1956. Gibberellins for growth. Chem. and Engin. News pp. 4496-7. Sept. 17.

Economic Size of Forestry Operations

Marion Clawson
Resources for the Future, Inc.,
Washington, D. C.

IF THE PRODUCTIVE potential of American forest lands is reasonably to be achieved and if future increased demands for forest products are essentially to be met, then the output of small forest holdings must be stepped up greatly. And if this is to be achieved, the economic problems of small forest landowners must be studied more carefully and more realistically than heretofore has been done.

Foresters all know the general picture: 219 million acres or 45 percent of all commercial forest land in the United States is in holdings of less than 500 acres, and 121 million acres or 25 percent in holdings of less than 100 acres. While much of this forest land is in farms and hence from an economic viewpoint must be viewed jointly with the farm business, 35 percent of the forest holdings of less than 100 acres and 37 percent of those with less than 500 acres are not parts of farms. By almost any forestry test, a poor job of forestry is being done on the smaller holdings; destructive or poor cutting practices are common, some lands need reforestation, much is understocked, etc. The output of these small holdings is low compared to their potential, and compared to the output from physically similar lands owned by large forest owners or in public ownership.

Much of the literature, many of the speeches, and the public programs to aid private forestry seem to assume that the chief if not the only reason for poor forestry on small private forest ownerships is lack of knowledge. According to this view, if the typical small forest owner can be taught good forestry, he will practice it, with consequent higher incomes for himself and much larger output of forest products for our economy. One purpose of this article is to challenge this viewpoint, at least to the extent of suggesting careful and rather detailed research in a wide variety of physical and economic situations. I strongly suspect we will find that the typical small forest owner has acted in an economically more rational manner, given his aims and objectives, than his advisers have proposed. The results of his actions may be less desirable from a social viewpoint, however.

Careful or intensive forestry on a continuous basis will be practiced in most cases only if the owner finds it profitable—not only profitable, but more profitable than any other type of forestry on the same land. A few landowners can be induced to undertake good forestry or other land management programs which are not the most profitable for them; but their number is small, and we cannot expect the typical small forest owner to carry out forestry which is economically unsound for him. The question then arises: what is economically sound for a particular forest owner?

This article is concerned with different questions: What are the factors that determine economies of size of forestry operations? Under specified natural and economic conditions, what constitutes an economic size of forest operations, for either full-time or part-time operation? Is there in fact *any* scale of operations that is economic for purposeful forestry management, under specified conditions? If a method of analysis can be agreed on, then research could unearth the facts and relationships in a particular situation. On this basis, perhaps sounder programs and more realistic estimates of the role of the small forest holding could be prepared.

Since many thousands of small forest ownerships exist and have persisted for many years, some may feel that the fact of economy of small forest ownerships has been proven. Much land in the United States will grow trees, with no care at all except very limited fire protection. But I do not consider such tree production as *forestry*. By the latter, I mean only planned, managed, purposeful production of forest products. Few forested areas produce commercial forest products to their biological potential, so this cannot be a reasonable standard for the small forest holdings. But the average production of the better managed large private holdings and of the publicly owned forests might be such a reasonable standard. What conditions are necessary if the small forest holding is to meet this standard?

In appraising the economic soundness of any enterprise, any one of several factors may be critical. Each is likely to require examination and study, in turn. The total result, as far as the economy of the forest enterprise is concerned, depends on the interrelationships of several factors, and the degree to which unusually favorable situations in some offset less favorable situations in others. But it is often helpful to start with the one you suspect is most important, and move to others in turn. In the discussion which follows, factors are taken up in the order I would expect to be most important.

Market Availability and Minimum Unit of Sale

A primary factor in the economies of forest production is the availability of a market for the particular products. Pulpwood, posts, piling, Christmas trees, sawlogs of different diameters and lengths, plywood bolts, railroad ties, and many other forest products can be produced, under different physical conditions. There are

also different species and different qualities of each product. Sometimes the physical possibilities are numerous, sometimes they are few. But what can be sold, and at what price? In some areas of the United States it is impossible to sell pulpwood, for instance, since there is no pulpmill located within a distance such that freight costs would not be greater than the value of the logs at the mill. In some areas, certain species cannot be sold at any price.

As a first step in research, it would be both interesting and significant to prepare a map of the United States showing in some detail the availability of markets for forest products. The map on page 19 of Special Bulletin 411, Michigan State University, on Marketing Pulpwood in Michigan, by Lee M. James, is an example of this kind of map. Obviously, the situation changes over the years, and researchers should keep abreast of it. In preparing such maps, consideration should be given to major and minor species, to various products, and possibly to different qualities of product. It would also be significant if the degree of potential competition could be noted—is there only a single possible buyer within economical transportation distance, or are there several? It should not be difficult to prepare such a map, or maps. Then we would know, as of the present, where different forest products could be sold. Obviously, if there is no market for certain products, or perhaps for any forest product, then no size of forest operation producing those products can be successful.

A problem closely related to availability of markets is the matter of the optimum size of sale of each product of the forest. It is a matter of common knowledge that small lots of forest products usually bring comparatively low prices. Often the seller is not well-informed or is not in a good bargaining position and hence unable to get all that his product is really worth; but the value of a very small lot of timber is less to the timber buyer than would be a larger lot of the same timber. But just how large is the price discount on small sales? We all know this varies by species, by quality of product, by degree of competition in an area, and by other factors. A few high grade white oak logs may attract enough buyers to yield a comparatively good price; or pulpwood may be salable in lots as small as a truckload in one area and only in lots large enough to warrant building a new pulpmill in another, for instance. Information is needed for each species, each forest product, and perhaps for each grade of each product.

There seems good reason to believe, and general knowledge seems to support the idea, that in each situation there is an optimum volume of timber to be sold as a single lot. The optimum volume is one which would bring the highest price per unit, given the product and the market. If volume per sale is either smaller or larger[1] than optimum, price per unit will be lower. The size of this optimum sales unit and the degree to which prices decline with larger or smaller volumes are matters upon which research might well be directed, for different areas, products, and qualities. There may also be some marginal volume of sale, which under particular circumstances it would just pay to sell at all.

Lack of any market precludes successful forestry operations of the sizes and types for which the market is lacking. The possibility of a future market may sustain operations for a time, but is not likely to be sufficient to induce the small forest owner to practice good forestry. For one thing, he may lack capital to tide him over to a future period of income. Some loss in prices obtainable for small volume per sale may not be fatal, though discouraging; but a large reduction in price because of small sale size might well be critical.

Under particular market conditions, it would be possible to estimate the acreage of forest of specified productivity or site class needed to produce sales of optimum, or near-optimum size either annually or at specified periodic intervals. This would certainly be one measure of econome size of forest operations.

Size of Harvesting Crews and Equipment

Another basic factor in economic size of forest operations is the necessary scale of harvesting. Given the tree species, the terrain, and other physical factors, what is the minimum equipment and minimum crew for reasonable efficiency in harvesting various forest products? There was a time when farmers with horses or oxen and simple hand tools could harvest various sizes of trees with about the same efficiency as could large specialized woods crews. For the most part, that relationship no longer holds. Power saws, crawler tractors, specialized loading and hauling equipment, and various other equipment items today are generally so much more efficient or so much less laborious to use, that farmers and others will not harvest timber by simpler methods.

These new machines and techniques require investments that are often beyond the financial means of farmers or other small-forest owners. Moreover, even if they had the capital to purchase such equipment, it would be uneconomic to do so for their small areas of land—the equipment would be used only a portion of the time.

Small forest owners can sometimes hire equipment or contract with harvesting crews to harvest their forest products. This permits sale of harvested products at roadside or at plant; sometimes resulting in the best obtainable prices. Sometimes the small forest owner sells standing trees, and the buyer harvests. It is generally believed that this usually results in a lower price for the products sold. In either case, however, there is some

[1] Small forest landowners would presumably never have too much timber in a single sale to obtain the maximum price, but this may happen with other forest landowners. See Federal Timber Sale Policies, Report of Committee on Government Operations, House Report No. 2960, 84th Congress, 2nd Session.

volume of products to be harvested below which the harvesting cost per unit will be significantly higher than for the minimum efficient volume, so that the net price to the grower will fall seriously. The cost of taking out a single tree or even several trees may be prohibitively high, because of the need to move equipment to the small holding. Moreover, in some areas a small forest owner may find it impossible to get any harvester interested in his few trees. In other areas, there may be several outfits available and interested in such work. The facts as to this matter in any local situation may go far toward determining the practicability of successful part-time forestry on an intensive basis.

Whether the harvesting is done by the owner with his own equipment, or by a contractor, or by the buyer, there will always be the temptation to harvest trees which from a forest management viewpoint should be left to grow, just to get an economically more efficient volume for harvesting. For the small forest landowner, harvesting economics and good forestry practices may thus be in conflict.

Research could establish rather easily the kinds, amounts, and cost of equipment and numbers of men needed for reasonably efficient forest harvesting crews under different physical situations, and could also determine the minimum volume to be harvested at one time in order to keep costs at nearly the lowest point. Comparable studies have been made of farm crop operations for many years. Even if the buyer harvests the timber, harvest cost considerations are still relevant, because they will surely influence the price he will pay for the trees. Given the minimum volume for a reasonably efficient harvest, it would be possible to compute the acreage needed to provide this volume annually or at specified periods, from forests of given productivity or site class. This acreage might be smaller than the area required to produce sales of adequate volume, in which case the latter would be the governing factor. On the other hand, the acreage as determined by harvesting considerations might be the larger, and thus the determining factor. Or some compromise between efficiency as judged from each viewpoint separately might be possible.

Technical and Managerial Skill Required

A third basic factor in determining economic size of either full-time or part-time forest operations is the level of technical and managerial skill required for forest operations of different sizes and the financial rewards that persons capable of acquiring such skills will insist upon. Foresters have often said that farmers and other owners of small forest tracts can readily be taught enough forestry to do a much better job on their land than has been done in the past. This is no doubt true, but it is not necessarily enough. Many small forest owners can probably be taught also to do a better job of business and financial management on their forests than they have done in the past. Getting more than one bid, if possible, for timber sold; marking the trees to be cut and inspecting the sale area to insure that cutting adheres to marking; harvesting the trees himself or by contract, and selling the logs by volume and by grade, in some areas; all of these, and other business practices are likely to affect forest income greatly in some situations.

The real problem is not whether the small forest owner can be taught these skills, but whether he will find the financial rewards from them worth the effort of learning and applying them. The average forest owner in the United States has 79 acres of forest land; by reasonably good forestry, but well within his ability to learn, he might increase annual output from 50 board feet per acre worth $8.00 per thousand to 125 board feet worth $12.00 per thousand, or gross income per acre annually from 40 cents to $1.50, or by 375 percent. This sounds like a very large gain, but it is only $82 annually in total. For the 3.8 million forest owners with less than 100 acres of forest land each, the average area of forest land per holding is but 31 acres. For this average small forest owner, the annual reward from better forest management, on the basis of these figures, is $34. What proportion of small forest landowners are willing to acquire and apply the forestry and business management skills necessary to achieve this increase in income and to do it for an annual reward of $34?

A critical factor in this problem is the rewards from equal time and effort expended elsewhere. If a farmer devoted the same time and thought to his principal farm enterprise, would he get more or less return than from forestry? If a business or professional man in town devoted the same time and effort to his business or profession, or even to investment on the stock market, would his returns be more or less than from forestry on his land? In a great many cases, we must concede that forestry will bring the lower returns.

As the area of forest land in one ownership or management unit increases, gross returns will surely rise, and often net income also. Returns to technical and managerial skill may rise, sometimes even more than proportionately to the increase in acreage. But the degree of those skills, and the ability of the manager, must also rise; and such men can command higher rewards from other economic activities. There may, or there may not, be a size of forest holding which will produce a return to technical and business management on either a full-time or a part-time basis, equal to the returns which men of this ability can earn by application of equal time and energy elsewhere. That could well be the subject of research, in a particular physical and economic environment.

The situation is not basically changed if the small forest landowner hires a forest consultant or manager. The latter will demand, and should receive, a reasonable return not only for his time but

also for his technical knowledge and skill. Charges by private consulting foresters may in fact provide the best estimates of reasonable returns to forest owners for application of similar skills. Consulting foresters often find it necessary to charge more per acre for managing small than large forest tracts, or impose some minimum charge regardless of acreage, or limit the proportion of small tracts they will accept. They often find it hard on a small tract to provide services, especially services other than sales of timber, at prices which provide them with a reasonable return and are profitable to the forest owner. The degree to which they are providing similar services for larger properties in the same locality may determine the feasibility of doing so for small properties. This is but another way of saying that minimum necessary technical and management skills often cannot be adequately rewarded from small forest tracts. The location of the forest landowner, his other interests and opportunities, and the returns from forestry management are all factors in the situation. Research should be able to provide some facts here also.

Capital Requirements

Thus far we have not considered the effect of capital or labor requirements upon economic size of forestry operations. Each size of forest, whether requiring full-time or part-time management, as determined by any of the foregoing approaches, will require capital for the land and standing timber, and also for equipment and other items. Major differences in capital requirements may arise on tracts of the same area, depending upon the intensity of the forest practices employed, the length of the cutting cycle, the average age and size of trees cut, the rate of stocking of the land, and other factors. The matter of optimum intensity of forest management is highly important and closely related to determination of economic size of forest holdings, but its consideration would extend this article too far.

But the same problem will arise with capital as we have considered with technical and managerial skill: Will the probable return be sufficient to attract the needed capital, in competition with other investments? Return on capital invested in forestry is often low, partly because tree growth rates are low. It is also often uncertain; fire, disease, and insects are recognized hazards. Return on forest capital is also highly dependent upon a long continuation of adequate forest management, and for a small forest tract this may be most uncertain. Most farm and other small forest owners will hesitate to invest new capital or to leave invested large present capital, the returns to which can come only after many years, when they may be dead, and which will be realized only by continued good forest management.

Moreover, small forest owners must consider returns on alternative uses of their capital. Most farmers with woodlots have inadequate capital for most efficient operation of their farms, and the return to additional units of capital are far higher on the farm than in the woodlot.[2] It is true that farmers may not often be called upon to make direct cash investments in their woodlots, but it is equally true that they can liquidate any merchantable forest growth and use the receipts therefrom to finance farm operations. We know very little about the other business activities of small forest owners who are not farmers. For many of them, capital for business or for living is probably scarce, and returns higher than in forestry. I would expect research to reveal that interest rates of 6 percent or more are relevant in estimating alternative uses of capital for the small forest landowner. Many forest properties cannot earn an equally high return from more intensive forest management.

For forests of economic size, as determined by markets, harvesting requirements, or technical and managerial skill requirements, there will be an appropriate capital requirement or a range of capital requirements. If the anticipated returns on this capital are less than its price (its return in alternative uses open to the forest owner), then capital scarcity or unavailability will be a limiting or determining factor in economic size of forestry operations. I strongly suspect that under many physical and economic circumstances there is no size of forestry operation that can return as much to capital investment as the forest owner can secure elsewhere, but this is a matter on which research could unearth the facts in specific situations.

Labor Requirements

Forests of any economic size will require some labor in addition to the harvesting which we have considered previously. One advantage often cited for the farm woodlot is that it provides a place for productive use of the labor supply of the farm family during seasons when the farm does not provide such employment opportunity. This may often be true; and to the extent that the previously discussed factors do not prevent or inhibit good forestry on this scale, the farm woodlot may offer many advantages. To the extent that its function is to provide employment to otherwise idle farm family workers, it should be large enough to provide such employment opportunity. This is a matter on which research could provide the facts.

However, in any particular situation the farmer may be able to organize or reorganize his farm so as to use his available labor supply more profitably on the farm than in the woodlot. Or he may be able to get part-time off-farm employment. The amount of essentially idle time of farmers and their sons is shrinking rapidly, under the impact of high nonfarm employment. Merely because there

[2] Redman, John C. Economic aspects of the farm woodland enterprise. Jour. Farm Economics 38:4, November 1956.

is now an unused labor force on the farm, does not prove that the woodlot is the best place to employ it. The woodlot is in competition with other farm enterprises for labor, as it is for capital and managerial skill. This is another matter on which research could provide relevant facts.

For the typical small nonfarm forest owner, opportunity to use otherwise idle labor is likely to be a minor factor. For some retired or semi-retired men, or for some with occupations that leave idle time at some seasons, opportunity to work productively in his own small forest holding may be important. We have little or no information on the employment patterns of small nonfarm-forest owners, but it seems probable that opportunity to work in their own woods is generally not important. Here again, alternative employment opportunities would be critical.

If forestry work is to be the sole or major source of income for the forest owner, then the economic size of forest holding, so far as this factor is concerned, could be determined by research. In general, it would be far above the acreage we think of as "small"—500, 1,000, or even more acres in many situations. If the forestry operation is part-time, then the relation between it and the other economic activity should be studied.

An additional factor affecting the use of small forest owner labor on his holdings is the time and cost of travel from his residence to his forest. For the local resident within a few miles of his holding, this may not be too serious. For the city dweller who owns a small tract of forest, it may be critical. Travel time and cost also inhibits owner management of small forests, but perhaps not as seriously as owner work in the woods.

If the small forest landowner does not wish to do the nonharvest forest work on his land, then availability and cost of hired labor and its supervision may become critical. The typical small forest owner may encounter serious difficulty in getting men to work on his land, partly because it will often provide such limited employment opportunity that they will not be interested. Supervision of men under these circumstances may be relatively costly, and much time may be lost in getting to and from the land. Work of this type can sometimes be contracted, but similar considerations enter even then. In some instances, work on small forest holdings can be integrated with work on larger properties. The economic size of forest holding, from the viewpoint of labor for nonharvest purposes, could be determined by research in each situation.

Opportunities for Research

If research on economics of size of private forestry operations were undertaken, each of the previously discussed factors should be considered. Any one of them might be the limiting factor in a particular situation. Research could consider all factors, and the data would determine which was limiting; theoretically, it would not matter which was undertaken first if all were covered. Practically, much effort might be saved if the factor we suspect of being limiting were examined first, and others examined only in so far as they limited or modified the conclusions of the first factor. For instance, in a particular situation market availability or minimum efficient sales volume might point to a size of operations so large that it would clearly be above that needed for efficient harvesting crews and machinery. While it might be interesting under these conditions to know what the minimum harvesting crew was, yet research resources could perhaps better be used on other problems. The same considerations apply to each of the other basic factors we have touched upon, or to combinations of them.

Any of the above factors may be limiting in an absolute sense, or only relatively so. There may be literally no market, or no source of labor available to the nonresident forest owner, in which case these factors would be absolutely limiting. In other situations, factors may be influential but not absolutely limiting; for instance, a somewhat lower price due to small volume per sale might not offset favorable relationships for other factors. The interrelationships of the latter type of factors is obviously important.

Research along the foregoing lines may well reveal that in many situations there is no acreage of forest land nor any intensity of forest operations under which it will be economic to operate on either a full-time or a part-time basis in accordance with good silvicultural practices. The moderately large output per acre from intensive forestry, but still well below biological potential, from many areas may require more labor, or more capital, or more managerial skill, or larger harvesting operations, or types of markets now nonexistent, or some combination of these limiting factors, than the returns from the enterprise will support at *any* scale of operations. Forestry, in the sense of purposeful and managed operations, is impossible for these lands, if it must be self-supporting. Such acres will grow trees "wild"—without much or any attention—and will at comparatively long intervals produce something worth harvesting. This method of forest production may be anathema to the forester, and yet it may be all the land is capable of, given the economic conditions of our time. I suspect many of the poorer sites in the commercial forest area in small holdings will fall in this category.

It seems obvious to me that substantial research on this matter is needed. Instead of speculation, such as I have indulged in here, we need reasonably reliable estimates of (1) areas in which no size and method of forest operations will provide sufficient income to be economic, given present costs and markets, and (2) size and methods of operation which are minimum economic in the other physical and economic regions or areas of the United States. Sample area studies would be useful, but

it seems to me the greatest need is some comprehensive or overall studies which would set a broad framework. For instance, the present market possibilities could be studied, perhaps in rather rough outline, as suggested above; or the matter of minimum economic harvesting unit and hence area might be considered on a national basis.

Alternatives for Small Forest Holdings

If adequate information were available, then it would be possible to gear public and private forestry programs to specific situations. For the small forest ownerships, it seems to me there are broadly four alternatives, or combinations of them:

1. We can accept their present low output per acre, as the best that is economically attainable, and write them off as not being realistically a source of much more forest products than at present.

2. We can outline the minimum changes in size of management unit which would make economic under present prices and costs the output of forest products which is silviculturally feasible. I use "management unit" deliberately, rather than "ownership unit" because it may be possible to change one without changing the other. Both part-time and full-time operations should be considered.

3. We can outline the changes in economic conditions which would make some scale of operations economic, at least under some conditions. For instance, how much forestry operations would capital at 4 percent, or 3 percent, or 2 percent make economic, that is not economic at 5 percent, 6 percent, or higher figures? What steps, if any, could be taken to meet deficiencies in market outlets, or to overcome problems of minimum scale of harvesting, etc.? Such changes would involve subsidies, an ugly word to many foresters; yet forestry in the United States is built very largely upon publicly subsidized fire control and this is widely accepted.

4. We can examine the institutional arrangements affecting small private forest holdings, and suggest modifications which might overcome some of the obstacles.

It seems to me that thoroughgoing research on the economics of small private forestry is urgently needed, so that sound facts can replace speculation, and so that programs can be geared to actual situations, in a way they are not at present.

Use of Wood Preservatives on Rise

The volume of wood treated with preservatives increased 2.5 percent during 1956, according to a survey made by the U. S. Forest Service in cooperation with the American Wood Preservers' Association.

Some 254.6 million cubic feet of wood was treated during 1956 as compared with 248.4 million cubic feet in 1955. This is a preliminary report based on figures from 310 of the 345 known wood-treating plants in the country, and represents most of the output of the wood preservation industry. It does not include preservatives applied by the do-it-yourselfers.

About 152.6 million gallons of creosote were used for wood preservation in 1956, a 1 percent increase over 1955. Pentachlorophenol use increased 25 percent to 13.1 million pounds to keep the lead among solid preservatives. Second and third most used solids are chromated zinc chloride and Wolman salts.

The increased use in preservatives occurred in treatment of poles, piling, and switches. Fewer crossties and fence posts were treated.

Educational Responsibilities and the Farm Unit Approach: Utilization and Processing

H. P. Berthy
Extension forester,
West Virginia University,
Morgantown

THE FARM woodland owner's interest in forestry as a farm practice is largely limited by his lack of understanding of forest utilization and his failure to recognize the woodlot as an integral part of his farm. Too often, as far as production is concerned, the woodland is forgotten or, worse yet, thought of as the hog range or cow pasture. This lack of interest points up the existence of a serious problem—timber production is considered as a minor part of the farm enterprise. To illustrate this fact, I would like to use my own state as an example.[1] In West Virginia, where two-thirds of the land area is best suited to the production of forest crops, we find this problem to be acute. The average farm, about 100 acres in size, is made up of a small amount of tillable land, a moderate amount of pasture and meadow, and 43 acres of woodland. While more than 40 percent of this average farm is in woodland, only 2 percent of the gross cash income is derived from the sale of timber products.

The above unhappy situation is not peculiar to West Virginia. Needless to say, this problem can best be met by education. Furthermore, educational methods can well be applied to the solution of the problem through the farm unit approach. This approach gives us an excellent opportunity to show that forestry is an integral part of successful farming. To support this statement, John Fallon, extention soil specialist, Missouri, says, "Balanced farming (the Missouri name for Farm Unit Approach) cooperators adopt more of all good practices, which have a way of supporting each other to pyramid their total effect."

[1]Data used throughout this article were taken from a study by West Virginia University as a contributory project to the Northwestern Regional Marketing Project, NEM-6, Marketing Forest Products.

Components of the Problem

For the purposes of this discussion, factors which work as a deterrent in the adoption of good practices in the farm woodlot can be listed as follows:

The small size of the operation (ie., a 40-acre woodlot), *which permits only a relatively small production of forest crops.*—This is an acute problem in areas where diversified markets are lacking. It normally results in heavy cuts on long rotations and the harvest is usually for only one product. In West Virginia, three-quarters of the sales are for only one product, while one- and two-product sales account for 95 percent of all sales. This one element of the problem as such—small size of operation—is more or less unchangeable.

The owner's interest and skills are not related to woods work, and this work has a low priority for his time.—One important factor involved here is the type of farm ownership. In West Virginia, less than one-third of the farms are classified as commercial. Owners of part-time and residential farms derive a substantial part of their income elsewhere. At best, forestry is only a supplementary enterprise. This element of the problem, as we will see later, can be greatly changed by education.

Low returns per unit of production, per unit of area, and per unit of labor.—This third component of the problem is a direct result of the two previously mentioned. It is here that a great deal of work is needed. Low returns from any enterprise are discouraging. On the farm where returns are generally low, we find the per unit returns for forest products very low. This leads to neglect of the woodlot by the owner, which puts him in an even poorer position with respect to the market. The downward trend can be slowly halted, turned, and started up again through education.

Need for Utilization Information

Before an owner can be expected to regard his woodlot as an integral part of his farming operation he requires knowledge of certain aspects of forest utilization. His lack of information in some important categories can be listed as follows:

Unfamiliarity with harvesting of forest crops.—All too often, the small woodland owner is inefficient in his operation. He has neither the equipment nor the experience to efficiently harvest a forest crop, and quite often he has not learned to use what equipment he has to best advantage. That is partly because little has been done to develop techniques for use by small woodland owners.

Unfamiliarity with timber products.—The handicap here is that an inexperienced seller is dealing with a relatively experienced and specialized buyer. The seller has difficulty in identifying the products so that he can cut and market them for the highest return. Almost 60 percent of the sales of timber in West Virginia are made without knowlelge of specialty markets available for timber products. Of all the timber sales made, only 14 percent of the owners attempted to find markets for more than one product in a single cut.

Unfamiliarity with measuring timber products.—This is a very common failure which leads to financial loss for small woodland owners. Because of their lack of knowledge in these practices, the sellers are largely dependent upon the buyers. Only about one-fourth of the sales studied in West Virginia were made on even a rough estimate. The remaining three-quarters of the timber sales were made without knowledge by the seller of the amount of timber he held. The cruiser's stick and volume table need to become as much a part of the farm woodlot as are the rake and hoe in the home garden. These are tools which the

average farm woodland owner can learn to manipulate to his profitable advantage.

Unfamiliarity with grading timber products.—All too often, a log is only a log regardless of its quality. On 53 percent of the timber sales in West Virginia, no grading was done. The buyers did grading on 42 percent of the sales. We find that 90 percent of all graded sales were graded by the buyer's grade, 10 percent by standard grade. We find ourselves with a landowner who is probably an excellent judge of livestock, capable of culling his herds and reserving his growing stock, but without an understanding of quality in logs and other forest products.

Unfamiliarity with market structures.—This is a very broad area and one with a great many important points. The seller has little knowledge or contact with the buyer of forest products, and lacks information on market prices. We find in West Virginia that timber sales are made predominantly without investigation. The sale is usually completed on an offer from one buyer, with only about 15 percent of these sales made on the asking price of the owner. Ninety percent of all sales reported were based upon the action of the buyer, which puts the seller in a very weak position. The buyer does most of the measuring of forest crops and the owner is at his mercy in the choice of unit of measure. Indicating this is the fact that 64 percent of the volume sold was measured on "thousand board foot," unqualified, and on the Doyle rule. Twenty-two percent of the volume sold was handled on the "piece" basis. Furthermore, more than one-half of the sellers had no knowledge of the services available in marketing forest crops, and more than two-thirds of the sales were made with no knowledge of marketing information. Of those professing marketing information, more than half of the presale knowledge was acquired from neighbors and other forest owners. Of course, this is usually better than having no previous information at all.

Farm Unit Approach

Keeping the various factors of the problem in mind, consider the "farm unit" approach and the ways that forestry fits into it.

Recently, while talking with one of our county agricultural agents who works on this program, I asked what was the biggest single problem he faced. The essence of his answer was that the program contained nothing new—the task was to create an awareness of the need for it. This being the case, what is the farmer's need for the woodlot and its products? Categorically, forestry practices in the woodlot meet four needs:

1. Supply timber products to carry out improvements on the farm.
2. Supply profitable off-season employment for part-time help and tend to stabilize farm labor.
3. Provide cash.
4. Fill a need for beauty and outdoor recreation.

When farm woodland owners become aware of the need for these services and the contributions forestry practices can make toward an improved standard of family living, they will begin to apply themselves to overcoming their lack of understanding of timber products, harvesting, processing, measuring, grading, and marketing. They will, in turn, devote more time to, and develop more skills in, these areas and thus increase their per unit return for unit of product, unit of area, and unit of time invested.

One example of the farm unit approach is a cooperator who in his plan of work for his farm included 10 major projects, as follows:

1. Plant six acres of coniferous trees.
2. Set up small sawmill and process logs from farm woodlot.
3. Lime seven acres of pasture and five acres of meadow.
4. Fertilize 16 acres of pasture and five acres of meadow.
5. Build a barn of home-grown materials.
6. Establish an alfalfa field trial demonstration.
7. Repair farm home.
8. Start manufacture of chestnut rail fence.
9. Repair fences and gates.
10. Improve access road to farm.

Notice how project No. 2 fits into the total plan. It is clear that it played a very important part in the completion of three other projects. The sawmill, using logs from the farm woodlot, produced timber products for the repair of the home, the fences and the gates, as well as the construction of the new barn. Processing a specialty product brought in extra cash, and the owner and his son found profitable employment at home. Note how these projects "have a way of supporting each other to pyramid their total effect." Utilization and processing certainly fitted into this farm unit plan.

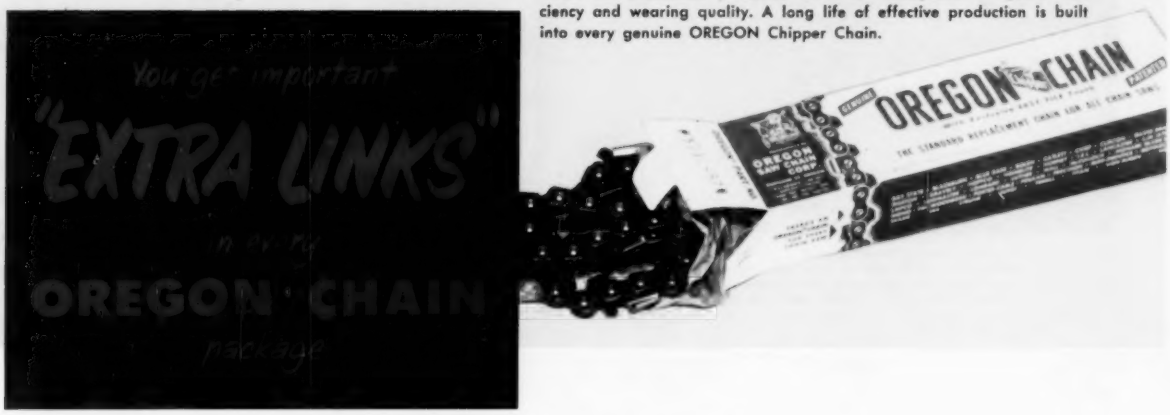
How does the extension forestry specialist fit into the picture? Actually, our first opportunity comes early in the game. We must make county extension workers aware of the possibilities of forestry before the first planning is started. In many instances, this will mean providing special training for county extension personnel who all too often are without training in forestry. In West Virginia, for example, we are holding forestry training schools for county extension workers to give them at least an understanding of the problems and possibilities of forestry on the farm. Certainly we cannot expect them to advocate practices with which they are unfamiliar.

Once we get forestry practices into the farm unit plan, we must continuously provide information on how to get the job done and assist by developing services and facilities which will result in the successful adoption of approved practices.

Subject-matter specialists have a large job in the farm unit approach. They must provide training, leadership, and technical guidance for which they will be repaid in the acceptance by farm unit cooperators of their subject-matter practices.

OREGON CHIPPER CHAIN . . . BUILT RIGHT, BACKED RIGHT

Skillful engineering, exclusive and unique manufacturing methods, and selected top grade steel make genuine, patented OREGON Chipper Chain the unmatched performer from the standpoints of speed, efficiency and wearing quality. A long life of effective production is built into every genuine OREGON Chipper Chain.



Scores of thousands of OREGON® Chipper Chain users have proved it.

You get important "extra links" . . . in the form of extra big-cutting profit, extra-long chain life . . . in every package of genuine OREGON Chipper Chain, whether it is a 100, 50, or 25-foot reel, or a continuous length of chain for a specific saw and bar.

You get these important extra values because genuine OREGON Chipper Chain is not only built right . . . it's backed right.

A nationwide organization of OREGON-trained saw chain service men see to it that you get the extra-big cutting profits, the extra-long chain life which are built into every genuine OREGON Chipper Chain.

No other cutting chain is so well-built, so well-backed. No other chain service group is so large, so well qualified to show you how to use and file your chain . . . so well trained and equipped to maintain and repair your chain professionally.

When you buy saw chain, specify genuine OREGON Chipper Chain . . . the chain that gives you extra-big cutting profits, extra-long chain life, because it is both built right and backed right.

TAKE YOUR SAW CHAIN PROBLEMS TO THE SHOP WHICH DISPLAYS THIS SIGN —

Qualified-Authorized
OREGON SAW CHAIN CORP.
TFS
TASK FORCE SERVICE
For Chains-Bars-Sprockers

© Copyright 1957 by

OREGON SAW CHAIN CORP.

PORTLAND 22, OREGON

OREGON® CHIPPER CHAIN
The Standard Factory Equipment
and Replacement Chain
Built Right - Backed Right

"How OREGON helps me"

W. F. ADKINS, Greenacres, Washington
"My OREGON dealer understands my saw chain problems. His instructions on maintaining chain and bars has given me longer chain life and higher daily output at minimum expense. He stands ready to give 24-hour service on our problems."

OREGON TASK FORCE SERVICE

Gives Chain Saw Owners
Extra-Long Chain Life
Extra-Big Cutting Profits

When you buy an OREGON Chain, you get a lot more than just a cutting chain. You get the backing of qualified OREGON dealer service personnel who are interested in your OREGON chain for the duration of its use.

Chain saw owners everywhere are getting more profits from their saws, more productive service from their chain, through OREGON Task Force Service dealers.

Read how these saw owners have benefited from OREGON Task Force Service. You will get the same advantages . . . the same extra-big cutting profits and extra-long chain life . . . when you take your saw to an OREGON Task Force Service shop for maintenance.

Look for the big TFS sign your Task Force Service shop displays. You'll see one in your area.

ROGER LAVOIE
Ste-Rose du Degéle, Que.
"I've greatly benefited by OREGON service and high quality. I have been cutting with OREGON chain for five years and find it is the most efficient and long-lasting chain on the market."

JOE BLAYLOCK
Roland, Arkansas
"My dealer has been great help in teaching me to maintain my OREGON chain properly. I cut 240 cords of pulpwood with my last OREGON chain, which lasted until the teeth were practically filed away."

MELVILLE A. NUGENT
New Gloucester, Maine
"My OREGON dealer not only takes good care of my chain, bar and sprocket problems, but has shown me how to take care of them and get the most out of them. OREGON-trained dealers really back OREGON chain right."

ADRIEN ROUSSEL
Edmundston, N. B.
"I have used OREGON chain since it first became available in Canada. There is nothing like it for a fast, smooth cut in both hard wood and pulp wood, either summer or winter. In addition, my dealer's service is always excellent."

JIM MARIER
Idlyd Park, Oregon
"OREGON chain is easiest to file, and bores the best of any. As an all-around chain you can't beat it. I'm in the woods to make money, and my dealer's very good service sure helps."

TAKE YOUR SAW CHAIN PROBLEMS TO THE SHOP WHICH DISPLAYS THIS SIGN —

Qualified-Authorized
OREGON SAW CHAIN CORP.
TFS
TASK FORCE SERVICE
For Chains-Bars-Sprockets

© Copyright 1957 by

OREGON SAW CHAIN CORP.

PORTLAND 22, OREGON

OREGON® CHIPPER CHAIN
The Standard Factory Equipment
and Replacement Chain
Built Right - Backed Right

Notes

Effect of Livestock Concentration on Surface-Soil Porosity Within Shelterbelts[1]

According to a survey made in 1954 by the Rocky Mountain Forest and Range Experiment Station, 30 percent of the shelterbelts planted in the Great Plains region between 1935 and 1942 have been seriously damaged by using them as "stomp and shade lots" for livestock (Fig. 1). Ten years ago, only 8 percent of shelterbelts in the region were being used by live stock. This destructive practice has more than tripled, regionwide, in the past 10 years, and it is partly to blame for the reduced effectiveness of many otherwise good windbreaks.

One obvious consequence of using shelterbelts for this purpose is the effect of browsing on the trees. Plantations used by livestock contain practically no understory. The trees are devoid of foliage from the ground up to 5 or 6 feet and are consequently open to the sweep of wind (Fig. 1). This condition tends to decrease windbreak efficiency.

The effect of trampling, another result of livestock use, is less easily observed, but it is likely to affect tree growth and vigor over a period of years by creating unfavorable site condition. This may be especially true where animals are restricted to relatively small areas. It is equally true, even when the tree plantation is part of a larger pasture area, because livestock congregate beneath the trees during the day to escape the heat. As a consequence of constant trampling, the soil tends to become compact, especially during rainy weather. Tree roots are frequently exposed and injured by trampling.

Trampling also pulverizes and scatters leaf litter and other organic materials that normally cover the soil surface within protected windbreaks. This material is then blown away from beneath the trees. Lacking this protective cover, the surface soils dry rapidly. Although not measured, soil organisms that improve soil structure and porosity were probably restricted because of insufficient organic food materials.

Another undesirable consequence of lack of litter and low tree foliage in shelterbelts heavily used by livestock is encroachment of annual grasses and weeds. Observations in 1954 throughout the eastern plains indicated that the presence of herbaceous vegetation in shelterbelts reduced vigor and growth of trees.

Method of Study

A study was made in the summer of 1955 to determine the extent to which trampling by livestock within shelterbelts has changed porosity of surface soils. This was done by selecting shelterbelts having contrasting conditions of use within the same planting, namely: (1) completely protected from all livestock use, and (2) heavily used by livestock for at least the past five years. The basic assumption was that soil porosity had been approximately the same throughout each shelterbelt at the time of planting and that, other things being equal, present differences in soil porosity are a result of livestock use.

Three shelterbelts were sampled on upland sites in east-central South Dakota. Species composition, stand age, soil texture, and topography were similar for all belts. Plantings ranged from 10 to 19 rows wide (about 120 feet), and contained on both sides shrubs of caragana, Russian olive, and chokeberry. Boxelder, American elm, green ash, and hackberry were the intermediate-sized trees; Siberian elm and cottonwood were the tall trees. Less than 10 percent of the cottonwood had survived. All belts were between 18 and 20 years old. Analyses of particle size showed that all soils were silty clay loam with an average composition of 13 percent sand, 53 percent silt, and 34 percent clay.

The only apparent difference within shelterbelts was the presence or absence of livestock use. The heavily used part of each belt was completely browsed out beneath the trees, while the protected part contained fairly dense shrub rows and other understory tree and shrub reproduction. A marked contrast was observed in amount and distribution of the lit-

FIG. 1.—*Left:* This part of the shelterbelt shows results of heavy use by livestock. *Right:* This part shows results of protection.

[1]Research reported here was conducted by the station's field unit in Lincoln in cooperation with the University of Nebraska. E. K. Ferrell, extension forester, South Dakota State College at Brookings, assisted with field work; A. P. Mazurak, associate professor of agronomy, University of Nebraska, made the laboratory analyses.

TABLE 1.—COMPARISON OF BULK DENSITY AND POROSITY OF SURFACE 3 INCHES OF SOIL IN SHELTERBELTS HEAVILY USED BY LIVESTOCK VERSUS PROTECTED PARTS OF THE SAME BELTS. BASIS: FOUR SAMPLES OF SOIL IN EACH PART OF THREE 18- TO 20-YEAR-OLD SHELTERBELTS IN SOUTH DAKOTA

Shelterbelt	Bulk density		Total pore space		Large pore space	
	Heavily used	Protected	Heavily used	Protected	Heavily used	Protected
	Grams per cc		*Percent*	*Percent*	*Percent*	*Percent*
	1.15	0.84	54.2	64.7	7.2	19.0
A	1.15	.84	53.6	63.2	8.3	20.4
	1.19	.90	53.3	62.1	5.7	21.8
	1.24	.97	52.1	57.1	4.9	14.9
Average	1.18	.89	53.3	61.8	6.5	19.0
	1.14	.92	57.2	64.3	13.2	18.1
	1.15	.95	57.0	61.3	10.9	16.7
B	1.17	1.07	55.5	56.4	8.0	6.9
	1.23	1.15	52.4	49.9	6.0	8.6
Average	1.17	1.02	55.5	58.0	9.5	12.6
	1.19	.99	49.4	56.8	8.0	12.9
	1.27	1.11	46.0	51.6	6.6	9.2
C	1.36	1.15	46.4	50.5	6.0	9.8
	1.43	1.20	43.6	49.6	6.3	10.6
Average	1.31	1.11	46.4	52.1	6.7	10.6
Mean (all belts)	1.22	1.01	51.7	57.3	7.6	14.1

ter layer. Leaf litter and other organic materials were rather sparse and often entirely lacking in the heavily used part of shelterbelts. In places, a medium to dense growth of herbaceous vegetation, mostly annual grasses, occupied the soil surface. Where this vegetation was lacking, the soil was generally bare. In contrast the surface soil in protected parts of shelterbelts was almost completely covered by leaf litter and other dead material; in places the litter was 2 to 3 inches deep. Only a few spots of bare soil or herbaceous vegetation were evident.

In both the protected and unprotected parts of each shelterbelt, four samples of the surface 3 inches of the A_1 soil horizon were obtained by means of a Uhland sampler. The surface covering of organic material (L and F layers) was first removed and discarded. The sampling cylinder was then driven directly into the mineral soil. If tree roots were encountered, as they often were, a new sample was taken. All samples were taken within the two or three cottonwood rows (near the middle of each belt) at intervals of 50 to 100 feet.

Cylinders of soil were carefully removed, smoothed on both ends, and placed in containers for transporting to the laboratory. Samples were saturated with water, then drained at 60 cm. tension, and the amount of water removed was the measure of large pore space.

Results

Analysis of data (Table 1) showed that surface soils under the heavily trampled condition were consistently more compact than those in protected parts of the same shelterbelts; average bulk densities were 1.22 and 1.01, respectively. Total pore space of heavily trampled soils averaged 51.7 percent, whereas that of protected parts of the same shelterbelts averaged 57.3 percent.

Since rate of water infiltration into soils is more dependent upon large pore spaces than upon total porosity, the percentage volume of large pore space is of special interest from the standpoint of moisture available for tree growth. Large pore spaces occupied 14.1 percent of the surface soil volume under protection as compared with only 7.6 percent under heavily trampled conditions. The differences in average values for bulk density and pore space between heavily used and protected areas (Table 1) are highly significant statistically.

Although these data are restricted to only three shelterbelts in South Dakota, observations throughout the Great Plains region indicate that concentrated livestock use in shelterbelts on silt loam soils results in soil compaction.

RALPH A. READ
Rocky Mountain Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture

Second Meeting on International Forestry Statistics

A second session of the Joint Working Party on Forest and Forest Products Statistics was convened in Geneva November 12-17, 1956. (The first was reported in the August 1956 JOURNAL.) The Working Party consists of European and North American forestry statisticians called to advise the Food and Agriculture Organization of the United Nations and the Economic Commission for Europe on urgent statistical questions. The following items were discussed: utilization and end-use statistics, noncommercial timber disposals, pulpwood statistics, forestry investments, statistics of production from trees outside the forests, felling forecasts, production and trade statistics, and forest fire statistics.

Several studies recently carried out have revealed the scarcity of reliable statistics on wood consumption by end-uses. Apparently in only two countries, Finland and the United States, has there been any comprehensive study of forest products utilization. The Working Party suggested that the Secretariat prepare in consultation with experts a draft program on utilization and end-use statistics to be submitted to the various countries for comment in advance of the next session of the Working Party.

By "noncommercial timber disposals" is meant the utilization of wood outside the normal market channels, for example, by farmers from their own forests. The prob-

lem is how to determine the details of these disposals, when no records are available. The quantities involved are appreciable in many countries, and where statistics are collected they may come from various sources. The Working Party made three recommendations: (1) all countries where these non-commercial disposals are quantitatively important should attempt to collect these data, (2) information on techniques used should be circulated to interested countries through the Secretariat, and (3) international agricultural censuses should include questions on timber consumption by farmers.

The greatest difficulty found in collecting international trade statistics on pulpwood is that of proper classification. Many countries carry definitions of pulpwood in their trade accounts that exclude many of the materials now used for pulping, for example, hardwoods are often entirely excluded. Furthermore, wood destined for pulping in the importing country is often exported as fuelwood, logs, pitprops, or some other category. The Working Party recommended that countries having discrepancies in the trade accounts for pulpwood, when compared with the accounts of their trading partners, initiate bilateral investigations to determine the reasons for the discrepancies. The following definition of pulpwood was suggested: "coniferous and broadleaved wood, including wood residues (but not sawdust), for defibration or pulping by mechanical, chemical or combined means."

The problem of compiling statistics on investment in forestry had been discussed at the first meeting of the group. Further inquiry by the Secretariat revealed that (1) few countries made any attempt to relate expected future timber yields to expected costs of establishing forest plantations, (2) many countries do not differentiate between costs and investments and considerable confusion exists as to concepts and definitions, and (3) attention is being given these problems in the International Union of Forest Research Organizations. The Working Party believes necessary the clarification of certain key concepts such as investment, cost, revenue, etc., and the establishment of definitions therefor.

The collection of statistics of production from trees outside the forests is very important in countries such as France, Italy, and the Netherlands, where roadside trees and tree groups in fields and parks provide such an appreciable source of wood. It was recommended that countries make an initial survey and where the volumes are found to be appreciable the estimates should be kept up to date through periodic surveys.

The discussion of felling forecasts aroused interest because this was the first occasion in any international meeting of foresters that a report on expected fellings 5 and 10 years ahead had been made available. Estimates of fellings had been compiled from 16 European countries, the U.S.S.R., and the United States on any of four bases: (1) specific felling plans or programs, (2) allowable cut of managed forests, other records, and estimated trends in consumption, (3) silvicultural principles only, and (4) other bases, including potential demand. The tentative and preliminary figures indicate that the normally importing countries of Europe expect in the next 10 years to decrease their fellings by 3.3 million cubic meters (a cubic meter of roundwood equals 35.3 cubic feet). The normally exporting countries on the other hand expect an increase in cut of 20.1 million cubic meters. The Mediterranean countries (Italy, Portugal, Spain, and Turkey) predicted decreased fellings of 1.7 million cubic meters. Increases in fellings of 83.5 million cubic meters are estimated in the U.S.S.R., from 29.8 to 57.8 million cubic meters in the United States depending on the assumptions made.

Three developments in the manufacture of pulp and woodbased sheet materials, namely the growth in output of dissolving grades of pulp, the increase in production of pulp by a combination of chemical and mechanical processes, and the development of particle board manufacture, require amendments in the questionnaires used for the collection of international statistics.

Forest fire statistics have been collected from the European countries by the European Forestry Commission of FAO since 1952, including number of fires and area burned by causes, listed by season of occurrence. The need has been felt for additional information, particularly on costs and damage. The Working Party was of the opinion that international statistics on forest fires should give information on the number, extent, incidence, and cause of forest fires, their economic significance, effectiveness of control, and the relation between control efforts and results secured. The difficulties of collecting international statistics on cost and damage appeared too great, however, to justify any present attempt to collect these figures. The Secretariat was instructed to obtain from member countries details of cost and damage estimation and to submit draft proposals to a future session of the Working Party. The collection of fire incidence data by season was found to be of little value internationally and its discontinuance was therefore recommended.

Participating in the second session were delegates from Austria, Belgium, Czechoslovakia, Federal Republic of Germany, Finland, France, Italy, Netherlands, Sweden, Switzerland, Turkey, U.S.S.R., Eastern Germany, United Kingdom, United States, and Yugoslavia. Besides the sponsors, FAO and ECE, the international organizations participating included the Organization for European Economic Corporation and the International Confederation of Free Trade Unions. Mr. J. Keller, federal inspector of forests of Switzerland, again served as chairman.

J. O. LAMMI
FAO/ECE Timber Division
Economic Commission for Europe,
Geneva

Rooting American Sycamore Cuttings

Exploratory tests show that American sycamore (*Platanus occidentalis* L.) can be vegetatively reproduced by cuttings (Table 1). At the end of the first growing season the best survival, average height, and maximum height were 65 percent, 5.1 feet, and 8.4 feet, respectively.

All tests were conducted in nursery beds on a sandy loam soil at the University of Georgia School of Forestry at Athens, Georgia. Cuttings 20 inches long were made from 1-year-old sprouts of local origin in late October 1955. The cuttings, except those planted in November 1955, were packed in moist sphagnum and held in cold storage until March 1956. When planted, the basal end of the cutting was set at a depth of 14 inches in the ground. Rooting, as evidenced by survival, and height growth were measured after growth terminated in September 1956.

Three studies tested rooting and height growth in respect to the position of the cutting on the parent sprout (in terms of successive 20-inch segments above the ground), top diameter of butt cuttings, and fall versus spring planting. Position of cutting did not statistically affect survival, but the average and maximum height growth of butt cuttings was better than similar values for the other groups. Survival of large diameter butt cuttings was better than small diameter cuttings, and the largest diameter cuttings produced sprouts significantly better in average and maximum height. Survival and height growth were not significantly different for fall and spring planting, but the best average and maximum heights for all tests were from fall plantings. A midwinter examination of the underground portions of fall planted cuttings indicated that root formation occurred during the dormant season.

THOMAS C. NELSON

and DONALD L. MARTINDALE

Athens-Macon Research Center, Southeastern Forest Expt. Sta., Forest Service,

U. S. Department of Agriculture, in cooperation with the University of Georgia School of Forestry

TABLE 1.—FIRST-YEAR SURVIVAL AND HEIGHT GROWTH OF SYCAMORE CUTTINGS

Variable tested	20-inch segment on parent sprout	Top diameter of cutting	Replications	Cuttings per replication	Survival	Height: Average	Height: Maximum
		Inches	*Number*	*Number*	*Percent*	*Feet*	*Feet*
Position of cutting on parent sprout	1st (butt)	¼ to ½	3	10	40	3.4	5.5
	2nd	¼ to ½	3	10	10	2.0	2.5
	3rd	¼ to ½	3	10	33	1.2	2.9
	4th	¼ to ½	3	10	27	1.1	2.3
Size of butt cuttings	1st (butt)	Under ¼	4	10	23	1.2	1.9
	1st (butt)	¼ to ½	4	10	63	2.2	4.8
	1st (butt)	Over ½	4	10	65	3.8	6.0
Time of planting							
Fall	Random selection	Random selection	4	25	51	5.1	8.4
Spring	Random selection	Random selection	4	25	45	4.7	7.7

Important Notice to Subscribers

If you change your address please notify the JOURNAL OF FORESTRY, preferably in advance, by letter, post card, or post office form number 22-S. Be sure to give your old, as well as the new, address with your postal zone number if any.

You should also notify your local post office on postal form number 22 of your change of address. Both postal forms are obtainable at any post office.

Copies of the JOURNAL will not be forwarded by the Post Office Department. Hence, in order to avoid missing your copy as well as to prevent extra expense to the Society in supplying duplicates, you are urged to notify the JOURNAL as soon as you know your new address, a month in advance of change if possible.

JOURNAL OF FORESTRY
425 Mills Building
17th Street at Pennsylvania Avenue, N. W.
Washington 6. D. C.

Points of View

Comments on "Government Social Programs and Forestry"[1]

In the lead article of the March 1957 issue of the JOURNAL OF FORESTRY, Albert C. Worrell in his article "Government Social Programs and Forestry" does the profession a service in explaining these programs, but renders "forestry" and the "wood-using industries" an injustice in the "Implications For Forestry" and "Summary" sections of his article. He has raised some very pertinent questions on the last two pages of his article, but has not given full explanation of the background for the current status of these social programs in relation to forestry, nor can I see that he has consulted with the "wood-using industries" for answers to the questions he raises.

As a member of the Society of American Foresters in private employ, I feel sincerely that answers to the more important questions he raises should be made and published in the JOURNAL at the first opportunity. These questions and my answers and comments in brief are as follows:

Question 1.—"Why then are workers in logging—one of the most hazardous occupations—specifically excluded from the protection of this program (of Workman's Compensation) in some states?"

Answer. — The states concerned—Maine, North Carolina, South Carolina, and Florida—have not completed the evolutionary changeover from the time there was no Workmen's Compensation for any industry. There is no denying the hazardous nature of logging, but one of the states, Florida, which Professor Worrell mentions, exempts "turpentine labor." This is not logging. Indeed Congress on numerous occasions has classified it as "agricultural" labor. In the State of Maine only the independent and "unassenting" contractors may be exempt. Please note that I say "may" be exempt. In Maine, as in South Carolina and North Carolina (the latter with a partial exemption), most full time logging contractors carry self insurance or some form of accident insurance that does protect the workers, who in any case can resort to court action if their claim for compensation is not recognized. If this analysis of Workmen's Compensation were made complete, it is doubtful if the total workers engaged in logging in the four states concerned who are totally unprotected by any type of compensation insurance would amount to more than *3 percent of the total forestry and logging labor force in the United States.*

Question 2.—"Why do these standards (minimum wage and overtime provisions) not apply equally to small logging and forestry operations, which have never been noted for high wages or short working hours?"

Answer.—Even though pulpwood workers of employers with 12 men or less are not under coverage of the Fair Labor Standards Act, they all are, with minor exceptions, earning wages that are equal to or much better than the current minimum of $1.00 per hour. This is particularly true in the Northeast, the Lake States, and the West where wages in excess of $2.00 per hour are common and the average wage earned is well over the minimum. In the South we have the benefit of a recent report of the United States Department of Labor to give us assurance that most logging workers are earning in excess of the $1.00 hour minimum. This report is entitled "Studies of the Economic Effects of the $1.00 Minimum Wage." In its Introduction and Preliminary Findings on page 5, it has this to say about the 12 man exemption: "The exemption applicable to logging operations utilizing 12 or fewer logging employees has not resulted in lower wages for exempt employees than for subject workers in integrated mills in the South." On pages 46 and 47, this report states that logging workers to whom the exemption applied were paid an average of $1.03 per hour and that only 2 percent earned less than $1.00 per hour.

In short, even in the South where living costs and wages are lower, there is no basis for the implied charges that forestry and logging employees in general who work under the 12 man exemption are not earning a minimum wage, or not being paid overtime when they work overtime. The few workers who do earn less than $1.00 per hour under this exemption at the most cannot amount to much more than *2 percent of our total forestry and logging labor force.*

Elimination of the 12 man exemption would actually affect only a small group of workers who are either unable or not sufficiently industrious to earn a minimum wage on a piecework basis. Such individuals would of necessity be laid off any woods job where an employer must get $1.00 per hour of work from them. In short, these few workers would be deprived of a job if they had to be placed under the Fair Labor Standards Act as recommended by Professor Worrell. This would not be a forward step in social progress, but would be an injustice and a personal calamity to the older or handicapped workers who cannot or do not want to work at anything but woods work.

Question 3.—"Why are gum naval stores workers separated out to be denied this old age insurance?"

Answer.—I believe that the naval stores industry can best reply to this. It has already been pointed out that Congress does not regard this work as forestry or logging. If anyone cares to differ on the point, please note that turpentine work and care of individual trees is bordering upon a type of horticulture that is closer to agriculture than forestry or logging. It might be that agricultural workers should get old age insurance, but that is getting away from the subject of Mr. Worrell's article.

Question 4.—"But why should forestry and the wood using industries be subsidized by the Government?"

Answer.—I have pointed out that the numbers of forestry and logging workers not getting the benefits of these "social programs" is insignificant. There is no basis therefore for Professor Worrell's general statement that "forestry" is being subsidized "at the expense of the employee." If anything, the small group of aged or handicapped individuals who are not earning a minimum wage are in effect be-

[1]Worrell, Albert C. Government social programs and forestry. Jour. Forestry 55:179-184. 1957.

ing subsidized by the forestry and logging industry. Most of them cannot or will not get employment in other industries, or cannot or will not accept welfare or subsistence payments from government agencies.

Question 5.—". . . does the trouble really lie in the bookkeeping and other difficulties of complying with the social program laws themselves?"

Answer.—Professor Worrell on his last page strikes on the crux of the problem which forestry and logging operations have in trying to comply with laws which in most cases are designed for application to *factory, store,* or *office operations.* He suggests no solution other than "simplification" of records or even some other kind of subsidy.

No subsidy is involved or required. Simplification of records would be desirable for Workman's Compensation and Social Security reporting, but is not the answer to the problem in applying the Fair Labor Standards Act. Since the Fair Labor Standards Act requires the employer to keep an accurate record of the hours worked by each employee, and employees' statements or records are not accepted by the Wage and Hour Division, it is obvious that it is completely impractical for small operators to keep such accurate records. Anyone who has tried to keep such records and to pay men on an hourly basis for woods work knows this. The result is that employers have for generations consistently used the piecework basis of payment for most woods operations, except in cases where large camps or large crews are employed in a relatively small area.

The average woods operation in which 12 men or less are employed is too small for the employer to afford a time keeper or woods boss in the woods to make sure that the "hours worked" placed on time cards has some resemblance to fact.

Imagine, if you will, a typical pulpwood producer employing less than 12 men. He may have one to five men cutting pulpwood, while a few more may be loading or hauling pulpwood in another area. The producer and employer of these men may be busy elsewhere, ordering a railroad car or buying more timber or selling other forest products besides pulpwood. He does not know when his men start working or when they quit. What value does any time card or any record of hours worked have under these typical circumstances? The only evidence the producer has that his men have worked is the volume or number of trees cut, peeled, skidded, or loaded.

This is a very difficult problem and there seems to be no solution to it for the small producer. Congress, too, has been unable to find a solution and in 1949 exempted employers of 12 men or less in logging and forestry operations from certain provisions of the Fair Labor Standards Act. Since that time Congress has continued to exempt these small producers from the provisions of this Act, compliance with which it does not consider practical.

Question 6.—Why are 12 men specified?

Answer.—The designation of "12 men or less" is close to an economic break-even point. On operations employing more than 12 men, the employer can afford to spend all his time on the job in the woods and hire someone else to keep records, sell his products, order railroad cars, replace workers, etc., or to follow the other alternative of hiring a foreman or woods boss to run the woods and loading end while he does these other jobs. A 12 man exemption is, in fact, a bare minimum, and it is only in considerably larger operations that compliance with the record keeping requirements of the Act becomes economically or physically feasible. In fact we think a more reasonable figure would be 20 or 25 employees.

A typical small producer with 12 employees will not produce much over 3,000 cords of pulpwood and other forest products per year, and that at best will amount to about a $60,000 business. This is much less than the $500,000 to $1,000,000 limitations contained in various proposals before this Congress to exempt "small" retail and laundry businesses from certain provisions of the Fair Labor Standards Act.

If Congress is going to extend coverage to businesses it regards as being larger than "small business" we wish to point out the inconsistency of setting a maximum limitation of $500,000 to $1,000,000 while at the same time eliminating the exemptions for employers of 12 men or less in logging and forestry operations where the gross income seldom is in excess of $100,000. This inconsistency is aside from the fact that it is not practical for pulpwood producers to comply with the Act so far as its record keeping requirements are concerned.

Conclusion

I have tried to show that there is no need for government action as concluded by Professor Worrell, "Government action to eliminate the inequities in coverage under these programs and to replace these disguised subsidies with something more realistic appears to be overdue."

I do not deny that logging and forestry have never "been noted for high wages or short working hours." Most industries which have depended upon a large amount of hard manual labor such as in agriculture and mining were not characterized by better wages or hours until certain of their operations became mechanized. Laboring and technical men gained more wages per week as the need for improved skills increased. This technical evolution is still taking place in forestry and logging and indeed among our professional foresters.

In conclusion, I firmly believe that progress has been good in adopting "social programs" to forestry and logging businesses and does not justify Professor Worrell's conclusion that further Government action is needed to eliminate inequities in these programs.

W. S. BROMLEY
Executive secretary,
American Pulpwood Association

The Division of Range Management—its Service to Forestry

Periodically we need to take a fresh look at our Society, its varied activities and functions, and answer the questions: Are we getting the whole job done? How can we increase the rate and quality of accomplishments in forestry? How can we improve the services rendered our membership in the SAF? Such an objective look was taken at the Division of Range Management during our Memphis meeting. I hope members have read the discussions on this subject published in the JOURNAL for April, Society Affairs, pages 312 to 316. The central question raised by these discussants embodies some fundamental considerations of vital concern to the membership of the Society of American Foresters.

The Society formally recognizes subject matter Divisions encompassing all the major activities of foresters. As each of these subject Divisions is maintained in a vigorous and active position, the capacity of the Society to assume its proper position of leadership in forest land use and management increases. The interest of professional foresters and the demands of their jobs are the things that have directly or indirectly created all these subject Divisions. Yet we must not become confused and think of them as membership Divisions as some people have done. Our bylaws specifically state that it is not the purpose of the subject Divisions ". . . to create vocational groups within the Society."

It seems to me, therefore, that when forest industry recognizes as it does the importance of forest-grazing management in silvicultural practice and in the conduct of a company's business, we as members of the Society of American Foresters cannot afford to officially or otherwise deny the importance of this phase of our interest as professional foresters. The forester is not necessarily a professional range manager, but his business and his day to day activities—in a major part of our country—frequently require that he avail himself of information and that he make management decisions involving forest-grazing problems. The Society and the profession are, therefore, strengthened when we provide our membership with the facts upon which to base sound decisions in these instances. This is a continuing need of forestry; and it cannot be eliminated by deciding arbitrarily to discontinue, or to combine with another the Division of Range Management. It represents an integral function of forestry.

As further evidence of this fact we see company after company of private forest industry doing progressively better jobs of managing and utilizing the forage resources of their forest lands. Even in the Douglas-fir region an awareness is growing of the forage resource and of timber-grazing relations, and things are being done about it. In the area of federal forestry, the Civil Service Commission has maintained the Forester (Range Option) register and they usually find it is short in supply of well qualified men. With the advent of intensive forest management in the South foresters help meet the problem of integrating the timber and forage resources of the Southern Pine Region.

It is a bit incongruous that we should be questioning, in the face of this recognized interdependence of two professional disciplines, the place and function of the Division of Range Management in our Society. If these two fields were not inextricably linked together we could not look back into recent history and see forestry as the mother profession which gave birth to range management, first as a function within forestry demanding training, specialization, and subject matter information, and finally becoming recognized as a full-fledged profession itself, the American Society of Range Management, with its own publication medium (JOURNAL 55:213). This latter step in the development of range management did not change the facts and the situations which confront the practicing forester. He still finds range management—the use of the understory cover by domestic and/or wild animals—a vital part of his day to day job as custodian of the land.

Speaking also as a charter member of the American Society of Range Management, I feel that we in this Society have an obligation to our range management profession to keep certain technical facts, viewpoints, and advancements before our colleagues in other areas such as forestry. Only by such crossing of the chasms between specializations can we make possible the kind of well-balanced and integrated thinking which is necessary in developing the best land-use patterns and management to meet the needs of our growing nation. The subject Division of Range Management in the Society of American Foresters is an essential link in this relationship.

It is my opinion that we have let our reactions to occasional low attendance at Division meetings influence our thinking on the role of the Division in our Society. Some people feel that low attendance and the near absence of range management articles in the JOURNAL OF FORESTRY indicate lack of interest in the Division of Range Management. I would attribute it to apathy and the inertia of rest. All we need is to push and get the ball rolling. Remember, we have at least 586 members (about 4½ percent) who consider forest grazing of sufficient importance to indicate it as an important division of interest; and this does not represent the total opportunity of the Division of Range Management to serve our membership. As a quick check on this I looked up six private industry foresters who are seeking solution to grazing problems on company lands. All are members of the Society of American Foresters, and of the six only one had indicated range management as an important area of interest. This merely means that the Division has a potential clientele far in excess of 586.

The function of the Division of Range Management is to serve these members. Practicing foresters are looking for information on forest grazing problems and the editorial board is anxious to see their needs met through the pages of the JOURNAL OF FORESTRY. The question is not should it be done, but how? Our answer to this question and the degree to which we succeed will in significant measure determine the direction and extent of the future growth and development of the Society of American Foresters. Can our Society provide the leadership in resource management suggested by R. S. Campbell in the closing paragraph of his discussion, or will it go to another group by default? The answer depends on us as foresters.

CHARLES E. POULTON
Associate editor
for Range Management.
Corvallis, Oregon

Reviews

An Outline of Norwegian Forestry

By Knut Skinnemoen. 104 pp. Illus. Det Norske Skogselskap (The Norwegian Forestry Society), Møllergt. 16, Oslo, Norway. 1957. (No charge.)

The purpose of this book, stated in the preface by President Anker Rasch and Director Nils N. Ihlen of the Norwegian Forestry Society, is to give English-speaking foresters a concentrated survey of Norwegian forestry and forest industry.

The author-editor, Knut Skinnemoen, is a well-known former professor of forestry in the Norwegian Agricultural University and is now supervisor of the state forests in Akershus County. Øyvind Nossen, who wrote the industry section, is a former editor of the monthly "Norwegian Forest Industry" and is now with one of Norway's greatest paper concerns. Thv. Kierulf, who wrote the sections on Protection of Nature, Organizations, and Forestry Periodicals, is an authority on nature protection and member of the staff of the Norwegian Forestry Society.

Four-fifths of the space is devoted to forestry. Natural, historical, silvicultural, economic, and policy conditions, felling and transport, government organization and administration, and other important phases are described in 16 subsections. The principal features of The Forest Protection Law of 1932 are stated. This law is the basis of government control on private forest land—83 percent of all forest land.

Norway is a rugged country with a coast line deeply indented by fjords. Although one-third of its length is north of the Arctic Circle, the climate is so tempered by the Gulf Stream that temperature is a minimum restricting influence on forests at the lower elevations. But locally climate, soil, and topography vary widely so there is also a wide range of forest growth conditions. Only Norway spruce, Scotch pine, and birch are commercially important.

The bulk of the forests are in southeastern and west central Norway. Forest land comprises 24 percent of the total area in contrast to 56 percent in Sweden and 71 in Finland. The vital importance of forests in Norway's economy has stimulated the development of forestry over a long period. Generally silviculture aims at even-aged stands, frequent thinnings prior to maturity, then harvest cutting and reproduction from seed trees, artificial seeding, or planting.

A 13-page section describes the historical development and the present situation of the pulp and paper industry which supplies Norway's most important export trade. Information is given by commodity categories and countries of export.

Protection of nature (preservation of natural areas), of growing importance during the last 50 years, is treated briefly.

The book concludes with helpful lists of the names, in Norwegian and English, of forestry and related organizations, and of forestry periodicals, with brief pertinent information about each.

Attractiveness and clarity are enhanced by many photographs and diagrams.

Forestry data are in the metric system, temperature in centigrade, and values in Norwegian crowns. A table of converting factors for the convenience of the unfamiliar reader would be helpful. A larger map showing the counties and other geographic features referred to in the text would also be desirable.

This book should be read by every English-speaking forester visitor to Norway for orientation and background, and by others who desire a quick overall view of Norwegian forestry. It is a very useful publication.

R. E. Marsh
Washington, D. C.

Manual for Analysis of Rodent Populations

Compiled by David E. Davis, 82 pp. Illus. Johns Hopkins University, Baltimore. 1956. $1.

This concise manual is designed to permit persons unfamiliar with mammals to obtain data useful in studying a variety of field rodent population problems. It is intended specifically for situations where information is needed about numbers, reproduction, mortality, and movements of rodents. Methods are described for accumulation and analysis of data by inexperienced personnel, but the interpretation of results is not discussed.

Detailed instructions are given for simple live-trap construction, laying out trapping grids, and recording and analyzing data. Discussions of population estimation stress the well-known Lincoln index method, including analyses of births, mortality, and movements. Emphasis is upon securing indexes rather than actual rates (of survival, for example). The method described for studying populations may not be universally acceptable to professional ecologists or mammalogists, but it is a reliable and simple one, well suited for use by foresters, range managers, or others who require data for operation planning.

The increasing necessity for rodent population data in connection with direct seeding projects should

make this a timely publication. Its usefulness is enhanced by inclusion of an excellent bibliography of 40 titles and a section devoted to discussions of alternate methods for sampling populations. An appendix contains short articles on methods of collecting ectoparasites, collecting and preserving tissues for histological study, collection of blood samples, and estimation of seed consumption by small mammals. The last, written by Dr. Lowell Adams, should be a valuable guide to those engaged in reforestation.

This lithoprinted manual is compact, well organized, and suitably illustrated with charts and drawings. The booklet was apparently developed from several years' practical application of field instructions to graduate students or technical assistants. It should be useful to teachers of wildlife management as well as to foresters, rodent control officers of the armed forces, and public health personnel.

CLIFFORD C. PRESNALL
U. S. Fish and Wildlife Service

Forestry Education in Pennsylvania

Edited by Henry Clepper. 169 pp. Illus. Penn State-Mont Alto Forestry Alumni Association. University Park, Pa. 1956. $4.

Penn State and Mont Alto forestry graduates, according to a map in the appendix of this book, are found in all but three states of the Union, in Canada, Alaska, and overseas. (The three states are known for other geographical attractions than their forest cover.) To these widely scattered men *Forestry Education in Pennsylvania* will be of intense personal interest, the same interest that one would feel in reading a history of his family and the doings of his relatives. To others in forestry it will prove of interest also. It is a carefully compiled history with a wealth of detail and is a very readable story of the start and development of professional training in forestry in a region that was one of the birthplaces of the forestry movement in this country. Significant relationships of its development in the commonwealth are related to its nationwide start and growth.

Published to coincide with the Golden Anniversary celebration of Penn forestry training in May of this year, the book represents considerably more than a modest effort by the Association. It is a contribution to forestry history and literature.

One unique aspect of the beginning of forestry training in the Commonwealth of Pennsylvania strikes the reader. It has begun to fill a specific need. Penn citizens early became concerned with the depletion of their forest resources. This concern resulted in legislative action. A commission was appointed to study the magnitude of the problem, reported to the Legislature, and shortly thereafter the Governor created a Division of Forestry within the state Department of Agriculture. Dr. Joseph T. Rothrock was appointed the first Commissioner of Forestry in 1895. By this act Pennsylvania became the fifth state to create a forestry department, and it is one of two out of the five in which such a department has remained in continuous existence. An important keystone of the early program was the policy of acquisition of forest lands. The Commonwealth required men to handle its forests and in 1902 established the Pennsylvania State Forest Academy at Mont Alto, on state land, and as a function of the then renamed Department of Forestry. A forestry program called for foresters, and Pennsylvania undertook to train men specifically for Pennsylvania service.

Subsequently, in 1907, general professional instruction in forestry was begun at the Penn State Agricultural College.

The growth and functions of the two institutions are covered in detail until the Academy at Mont Alto, later renamed the Pennsylvania State Forest School, was merged with the Penn State College (later University) Department of Forestry in 1929.

The result of this merger created another unique aspect of professional forestry training in Pennsylvania. The first of the four required years is spent in residence at the Mont Alto Branch. Beginning technical work and basic cultural courses are given in a forest setting. The result, Penn State men believe, is that the freshman is more quickly oriented in forestry and develops a sense of comradeship with his fellow students that lasts far longer than his four years of college.

The book traces progressive developments in the training of foresters through to the present in detail. All pertinent subjects are covered including curriculum, physical plant, research, graduate work, social and honorary organizations, and student publications and other activities. The significant contribution made to forestry training by the alumni of the two schools is apparent.

The Department of Forestry became the School of Forestry in 1954 with two departments of its own, Forest Management and Wood Utilization. The student body totaled 329 men in 1956; the staff, 32 persons. Mont Alto, between 1906 and 1929, trained 243 foresters: Penn State, from its founding and after the merger, a total of 2,069. Eighty-two advanced degrees had been awarded. In 1956 an active extension program was in operation throughout the state and adult short courses at the School were meeting popular approval of nurserymen, landowners, and the state's timber utilization industry. Research was receiving increasing attention, and plans and hopes for further expansion of the School's role indicated a healthy and thriving status of forestry training in the Commonwealth.

An appendix gives a wealth of detailed information, including an alphabetical directory of alumni and a directory by classes.

Various chapters of the book are written by Henry Clepper, Wilber W. Ward, Victor A. Beede, Wal-

lace E. White, William C. Bramble, William R. Byrnes, Henry H. Chrisman, David P. Worley, and Walter W. Simonds. Numerous pertinent quotations of historic significance are given.

The reviewer has intentionally avoided mention of the names of individuals with the exception of Dr. Rothrock, "the father of forestry in Pennsylvania." History is events and developments, but more importantly it is truly the story of people. The history of forestry education in Pennsylvania is also the story of people, and is amply and interestingly covered in this excellent volume.

ARTHUR B. MEYER

Vermont Diary

By Viola C. White. 145 pp. Illus. Charles T. Branford Co., Newton Centre, Mass. 1956. $3.50.

A diary, so Webster says, is "a daily record especially of personal experiences or observations." *Vermont Diary* fully meets this definition. While the book deals primarily with observations of Nature, in Middleburg and environs, it is by no means wholly confined to them. In this highly personal account there is more than a simple recital of diurnal happenings. In fact, the reader gains a more vivid impression of the author than the events she relates. Interspersed are frequent comments on varied and sundry subjects running the gamut from the meaning of Pennsylvania Dutch words to an analysis of "Julius Caesar" and "Glass Menagerie." Her casual references to neighbors and friends assumes your familiarity with them. Indeed, after reading *Vermont Diary* you feel as though you have added to your circle of friends.

The author's concern is not with the how and why of Nature, but the now. Appropriately enough the diary opens with the spring thaw. I gather this is done, not without intention, perhaps to signify the renascence of Nature. The account ends with the closing-in of winter.

Enchantingly and refreshingly written, the book, once read, can be picked up later and read at random for moments of relaxation, especially by the city dweller who may explore vicariously the byways of rural living. The book has an attractive format and is beautifully illustrated, by Henry Martin, with sketches of the Vermont countryside. The following quotation for me, at least, sets the theme of *Vermont Diary:* "It is a solemn thought that merely absenting oneself from some force of life like the world of Nature, or friendship, or prayer, or association with children, may dull the appetite for it and be the means of eventually losing it."

AUDREY WARREN

Publications of Interest

Areas Administered by the National Park Service, a compilation of basic data on each of 181 areas as of December 31, 1956, is off the press of the Government Printing Office, the Department of the Interior has announced. The booklet may be purchased from the Superintendent of Documents, Washington 25, D. C., for 20 cents a copy.

Information about each area includes its gross area, broken down between federal and non-federal acreage; a brief description of its outstanding characteristics; dates of authorization, establishment, and changes of boundary; and the address of the superintendent.

• • •

Statistics on deer and deer hunting in Wisconsin are presented in *A Century of Wisconsin Deer* by Otis S. Bersing. The author states in his foreword that because of the many variable factors involved, the figures shown are not to be construed as accurate estimates, but are approximations showing trends. Figures are given in tabular form for easy reference and are divided into two sections, gun and bow hunting. Copies of the 184 page booklet may be obtained from the Game Management Division, Wisconsin Conservation Department, Madison 1.

• • •

Application of the Variable Plot Method of Sampling Forest Stands is research note no. 30, Oregon State Board of Forestry, Salem, written by John F. Bell of the Board of Forestry and Lucien B. Alexander, a partner of the firm Mason, Bruce & Girard, consulting foresters. The 22 page booklet is designed for the practicing forester who is interested primarily in the use of the technique. No price indicated.

• • •

A new manual on the practical and profitable handling of southern timber properties—the *1957 Forest Farmer Manual*—has been issued by the Forest Farmers Association, P. O. Box 7284, Atlanta, Ga. Designed to keep timberland owners—particularly the small owner—and timber growers, producers, and processors abreast of developments and trends in forest protection, management, harvesting, and marketing, the new 168-page edition is the work of better than 40 forestry and timber experts. It is edited by J. Walter Myers, Jr., the Association's executive director.

Presenting for the first time a comprehensive report on the extent, ownership, and condition of the forests of 15 southern states, including basic statistics for each state, this new and completely revised guidebook devotes chapters to forest protection, management, harvesting, marketing, naval stores, tools, and equipment essential to the timber grower, forest laws and taxation, forest accounting systems, wood preservation, grazing in woodland areas and wildlife management. In addition, it lists a South-wide roster of activities and organizations of interest to the forest farmer. Price: $4.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*

Range Management Section Compiled by Division of Bibliography, Library, U. S. Department of Agriculture

General

America's Natural Resources. Ed. by C. H. Callison. 221 pp. Ronald Press, New York. 1957. $3.75.

The Dark Missouri. By H. C. Hart. 336 pp. Univ. of Wisconsin, Madison 6. 1957. $6.

Directory of Research in the Growing and Harvesting of Pulpwood. By P. F. Graves and A. F. Horn. 8 pts. American Pulpwood Ass'n., New York 17. Dec., 1956. $12.00; $8.40 to APA members.

Forest Research Review 1956. 44 pp. Illus. British Columbia Forest Serv., Vancouver. 1957.

Ski Ranger. By Peter Thomson. Dodd, Mead, New York. 1957. $2.75. Teenage.

Forest Economics

Consumer Preference in Scotch Pine as a Christmas Tree. By John Haeskaylo. 3 pp. Illus. Ohio Agric. Expt. Sta., Wooster. 1956. For. Mimeog. No. 31.

The Demand and Price Situation for Forest Products. 24 pp. U. S. Forest Serv. and Commodity Stabilization Serv., Washington, D. C. 1956. Mimeog.

Marketing Pulpwood in Michigan. By L. M. James. 67 pp. Illus. Michigan State Univ. Agric. Expt. Sta., East Lansing. 1957. Spec. Bul. No. 411. Free.

Forest Management

The Boise Basin Experimental Forest for Better Forest Management. By A. K. Wilson. 23 pp. Illus. Intermountain Forest and Range Expt. Sta., Ogden, Utah. Dec., 1956. Misc. Publ. No. 8.

Private Forest Management in the Tennessee Valley. 13 pp. TVA Div. of Forestry Relations, Norris, Tenn.

Recommended Forest Practices for Illinois Hardwood Timber Types. 16 pp. Illinois Technical Forestry Ass'n., 301½ E. Monroe St., Springfield, Ill. Rev. 1957.

Windthrow Along Cutlines in Relation to Physiography on the McDonald Tree Farm. By E. C. Steinbrenner and S. P. Gessel. 19 pp. Illus. Weyerhaeuser Timber Co., Tacoma, Wash. Oct., 1956. Forestry Research Notes. Mimeog.

Forest Resources

Central States Timber Resources. Comp. by O. K. Hutchison and P. L. Thornton. 30 pp. Central States Forest Expt. Sta., Columbus, Ohio. 1957. Misc. Release No. 13.

Forest Inventory Statistics for Carter County, Tennessee. 18 pp. TVA, Norris, Tenn. 1957. Forestry Bul. No. 49. Mimeog.

Forest Resources of the Avalon Peninsula, Newfoundland. By W. C. Wilton. 33 pp. Illus. Canada Forestry Branch. For. Research Div., Ottawa. 1956. Tech. Note No. 50.

Our Growing Wood Supply. 22 pp. Illus. American Forest Products Industries, Washington 6, D. C. 1957. 10 cents.

The Rebirth of Timber as Our Most Versatile Natural Resource. An address by O. R. Cheatham Presented to the Ninth National Credit Conference of the American Bankers Association, Chicago, Ill. January 14, 1957.

Wisconsin's Renewable Resources. By J. A. Larsen. 160 pp. Illus. Univ. of Wisconsin, Madison. 1957.

Logging and Milling

Bark Peeling Machines and Methods. By E. W. Fobes. 48 pp. Illus. U. S. Forest Products Lab., Madison, Wis. 1957. Rept. No. 1730 rev. Mimeog.

Handbook for Small Sawmill Operators. American Society of Mechanical Engineers, 29 W. 39th St., New York 18. ASME Standard 109. $3.

Pathology

Bibliography of Forest Disease Research in the Department of Agriculture. Comp. by A. E. Moore. 186 pp. U. S. Dept. of Agric., Washington 25, D. C. 1957. Misc. Publ. No. 725. 55 cents (Govt. Print. Off.)

What's Wrong With My Tree? By S. D. Davis, Jr. 12 pp. Illus. Rutgers State Univ. College of Agric., Ext. Serv., New Brunswick, N. J. 1956. Leaflet No. 156.

Protection

The Big Blowup; the Northwest's Great Fire. By B. G. Spencer. 286 pp. Illus. Caxton Printer, Ltd., Caldwell, Idaho. 1956. $5.

A Chemical Fire Retardant; Results of Field Trials Using Sodium Calcium Borate on Forest Fires in 1956. By H. R. Miller and C. C. Wilson. 20 pp. Illus. California Forest and Range Expt. Sta., Berkeley. 1957. Tech. Paper No. 15. Mimeog.

Range Management

Shortgrass Range; Grazing Effects on Vegetation and on Sheep Gains. By R. L. Lang, O. K. Barnes, and F. Rauzi. 32 pp. Wyoming Agric. Expt. Sta. Laramie. Bul. 343. Aug. 1956. 100 W99.

Silviculture

Experimental Seeding of Black Spruce on Cormack Burn, Newfoundland. By W. A. Dickson. 12 pp. Illus. Canada Dept. of Northern Affairs & National Resources, Ottawa. 1956. For. Res. Div. Tech. Note No. 49.

Forest Planting Practices for Illinois Recommended by Illinois Technical Forestry Association. 35 pp. Illus. 301½ E. Monroe St., Springfield, Ill. Rev. 1957. Mimeog.

Occurrence and Effects of Summer Frost in a Conifer Plantation. By René Pomerleau and R. G. Ray. 15 pp. Illus. Canada Forestry Branch, Ottawa. 1957. For. Research Div. Tech. Note No. 51.

Le Sapin de Douglas et la Phytogéographie. By A. Galoux. 131 pp. Ministère de l'Agriculture. Station de Recherches, Groenendaal, Belgium. Travaux.

Sitka Spruce in British Columbia; A Study in Forestry Relationships. By W. R. Day. 110 pp. Illus. Great Britain Forestry Commission, London. 1957. Bul. No. 28. 1/0/0.

Wood Technology and Utilization

Evaluation of the Factor of Safety in Structural Timbers. By L. W. Wood and Marilyn Tasker. 40 pp. U. S. Forest Products Lab., Madison, Wis. 1957. Rept. No. 2068. Mimeog.

Fabrication of Small Clear Specimens of Timber for Strength Tests. By S. B. Bellosillo. 10 pp. Illus. U. S. Forest Products Lab., Madison, Wis. 1957. Rept. No. 2074. Mimeog.

Indulin; Lignin from Pine Wood. 53 pp. West Virginia Pulp and Paper Co., Charleston, S. C. 1957.

Society Affairs

Officers and Council
1956-1957

DEWITT NELSON, *President*
Department of Natural Resources
315 State Office Building 1
Sacramento 14, Calif.

B. E. ALLEN
Union Bag-Camp Paper Corporation
P. O. Box 570
Savannah, Ga.

PHILIP A. BRIEGLEB
Southern Forest Experiment Station
704 Lowich Building
2026 St. Charles Avenue
New Orleans 13, La.

C. HUXLEY COULTER
Florida Forest Service
Tallahassee, Fla.

GEORGE A. GARRATT, *Vice President*
School of Forestry
Yale University
New Haven 11, Conn.

STANLEY G. FONTANNA
School of Natural Resources
University of Michigan
Ann Arbor, Mich.

MAURICE K. GODDARD
Department of Forests and Waters
Harrisburg, Pa.

EDWIN F. HEACOX
Weyerhaeuser Timber Company
Tacoma 1, Wash.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N.W.
Washington 6, D. C.

JOSEPH S. ILLICK
College of Forestry
State University of New York
Syracuse 10, N. Y.

J. HERBERT STONE
U. S. Forest Service
729 N.E. Oregon St.
Portland 8, Ore.

HENRY J. VAUX
School of Forestry
University of California
Berkeley 4, Calif.

The President's Column

DEWITT NELSON

Recently the Association of State Foresters made a study of "Problems in Employment of Professional Foresters."

It is interesting to note some of the findings of that study. I shall endeavor to point out and discuss a few of them. In the first place it is difficult to accurately compare the many levels of positions because of great differences in titles, job descriptions and responsibility patterns. However, it is interesting to note that most top level positions require a professional degree in forestry. Most of us can remember when this was not the case.

The majority of the reporting states indicated that the starting salaries for graduates are too low to successfully compete with recruitment by industry. This is an unfortunate situation because the state forestry organizations play a vital role in the nation's forestry program. They not only are land and resource managers but upon their protection, skills and efforts depends a great deal of the long-term success of private industries management. The state organizations should be in a better position salary-wise to compete with industry for new personnel.

Less than half of the reporting states (15 out of 34) provide civil service for professional foresters. Several states reported modified forms of employee protection. I believe, however, that more states are gradually establishing civil service provisions and greater stability in their employment and personnel procedures. Stability and continuity of employment and high personnel standards are certainly desirable in public service.

The thirty-four reporting states employ a total of 8,403 permanent employees in the forestry agencies, with an additional 9,424 employees hired on a seasonal basis. Of these, 1,539 are classified as professional foresters. According to the statistics the number of foresters employed by states has practically doubled during the past ten years. The trend continues upward with a combined budgeted increase of 218 new forestry positions for next year. The difficulty of recruitment is also emphasized by the fact that 256 existing vacancies in professional positions are listed by state agencies.

Only two states reported no difficulty in filling vacancies and retaining their foresters. It appears that the primary recruitment and retention problems are due to the relatively low salary rates as compared with those of competitive employers.

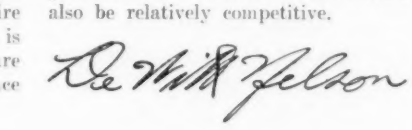
One can, of course, be philosophical about this but as a private forester stated recently, "we can not expect foresters to live on love of their job alone." I hope that the ever growing

importance of our forest resource and a realization of the role it plays in our state and natural economies will soon be more adequately reflected at the employment level.

It is a matter of pride to state and federal forest agencies that industry often looks to them as a source of recruitment. One of our public service functions should be that of training young men who will be competent in the various phases of professional work. The study indicates the desire and the need of the state foresters is for a fighting chance to get their share of the qualified men and to replace those whom they lose.

Healthy competition for professionally trained employees is highly desirable. It not only provides opportunities for individuals but also should bring out the best in every man. Likewise, it should stimulate the colleges and universities to provide ever-better training standards and facilities.

I hope the competition for foresters will remain keen but I believe salary provisions and related benefits should also be relatively competitive.



Sixth Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 2, 1957. A president, vice president, and nine other members of the Council will be elected for the two-year term 1958-1959.

The present Council is listed in the box on page 540. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

President DeWitt Nelson has announced that he will not be a candidate for re-election.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for over two decades.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.
2. All candidates must be eligible to hold elective office.
3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)
4. A voting member may not sign more than one nominating petition for president, nor more than one nominating petition for a member of the Council. That is, he may sign two, but no more.
5. Petitions must be in the Society office by September 18, 1957.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1958-1959.

A nomination is not valid until the candidate has accepted the nomination in writing. His acceptance should accompany the nominating petition, and may be written as follows:

I accept the nomination to the Council of the Society of American Foresters for the two-year term 1958-1959, and agree to serve if elected.

All nominating petitions should be sent promptly to the Society office. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Nelson. The Committee is composed of the following members:

Chairman, J. H. Johnson, Chesapeake Corp. of Virginia, Box 534, West Point, Va.

S. T. Carlson, National Park Service, P. O. Box 1728, Santa Fe, N. Mex.

Albert Engstrom, Oklahoma Division of Forestry, Capitol Building, Oklahoma City, Okla.

James E. Sowder, Deschutes Research Center, U. S. Forest Service, Bend, Ore.

Harry E. Troxell, School of Forestry, Colorado A & M College, Fort Collins, Colo.

This committee is charged with the following duties:

1. To set the date of the election. (December 2, 1957 is the date.)
2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.
3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations. For their information the distribution of Council members by states during the period 1942-1957 is shown on page 388 of the May issue of the JOURNAL.

Nominations Received

Up to the time of going to press the following nominations had been received:

For President

George A. Garratt, New Haven, Conn. (Vice president, 1956-1957).

Henry J. Malsberger, Atlanta, Ga.

For The Council

B. E. Allen, Savannah, Ga. (Council member, 1956-1957.)

Philip A. Briegleb, New Orleans, La. (Council member, 1956-1957.)
S. T. Carlson, Santa Fe, N. Mex.
Donald E. Clark, Denver, Colo.
Kenneth P. Davis, Ann Arbor, Mich.
M. B. Dickerman, St. Paul, Minn.
Glen R. Durrell, Stillwater, Okla.
M. K. Goddard, Harrisburg, Pa. (Council member, 1956-1957.)
William D. Hagenstein, Portland, Ore.
P. T. Lannan, Georgetown, S. C.
A. D. Nutting, Orono, Maine.
Russell Stadelman, Memphis, Tenn.
J. Herbert Stone, Portland, Ore. (Council member, 1956-1957.)
Henry J. Vaux, Berkeley, Calif. (Council member, 1956-1957.)
Ernest Wohletz, Moscow, Idaho.

J. H. JOHNSON, *chairman,*
Nominating Committee

Sixth Call for Fellow Nominations

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 2, 1957.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters of outstanding achievement as leaders in responsible directive or distinctive individual work of a fruitful character. They shall be elected from the Members and shall be engaged in forestry work at the time of their election."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate John Doe for election to the grade of Fellow in 1957.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 200 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than September 18, 1957.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Fellow Nominations

On the date of going to press, the following Members had been nominated for the grade of Fellow:

James F. Dubuar, Wanakena, N. Y.
Edwin F. Heacox, Tacoma, Wash.
Svend O. Heiberg, Syracuse, N. Y.
Norman G. Jacobson, Tacoma, Wash.
Harvey J. MacAloney, St. Paul, Minn.
DeWitt Nelson, Sacramento, Calif.
Earl Porter, Mobile, Ala.

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows and the present Council. (A Council member who is also a Fellow has but one vote.)

The system is described in Article IV, Section 4 of the Constitution. To win election a candidate must receive an affirmative vote of not less than one-half the total votes cast.

During 1957, the voting membership of the Society will have an opportunity to ballot on a proposal by the Council that would increase the number of Fellow electors. If the referendum is approved, the chairmen of the 21 Sections and the chairmen of the 11 subject Divisions, a total of 32 electors, will cast votes for Fellows in addition to the present Fellows and the Council. For a detailed discussion of this proposal members are referred to the JOURNAL for April 1956, page 279, and for June 1956, page 410.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding achievement. Fellows do not pay increased dues: their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 109 Fellows elected. At the present time the number of living Fellows is 75.

List of Fellows

The current roster of Fellows follows. The state in which each Fellow is domiciled and the year of his election are shown after his name.

Allen, Shirley W. Michigan. 1948.

Bailey, Reed W. Utah. 1955.
Baker, Frederick S. California, 1949.
Besley, Fred W. Maryland. 1940.
Boyce, John S. Connecticut. 1955.
Brundage, Frederick H. Oregon. 1949.
Butler, Ovid. Maryland. 1940.

Carter, E. E. District of Columbia. 1942
Chapman, Herman H. Connecticut. 1922.
Clapp, Earle H. District of Columbia. 1930.
Clepper, Henry E. Virginia. 1949.
Coffman, John D. California. 1946.
Cox, William T. Minnesota. 1953.
Curran, Hugh. Venezuela. 1951.

Damtoft, Walter J. North Carolina. 1951.
Dana, Samuel T. Michigan. 1935.
Demeritt, Dwight B. Maine. 1955.
Demmon, Elwood L. North Carolina. 1951.
Detwiler, Samuel B. Colorado. 1955.
Drake, George L. Washington. 1953.

Eldredge, Inman F. Lousiana. 1942.
Evans, Charles F. Georgia. 1949.
Evenden, J. C. Idaho. 1953.

Ferguson, J. A. Pennsylvania. 1949.
Fischer, Arthur F. California. 1940.
Fontanna, Stanley G. Michigan. 1955.
Fritz, Emanuel. California. 1951.
Frothingham, E. H. California. 1942.

Garratt, George A. Connecticut. 1953.
Gill, Tom. District of Columbia. 1948.
Granger, Christopher M. Maryland. 1946.
Guise, Cedric H. New York. 1951.
Guthrie, John D. Virginia. 1942.

Hall, J. Alfred. Wisconsin. 1955.
Hall, William L. Arkansas. 1940.
Hartley, Carl P. Maryland. 1949.
Hawes, Austin F. Connecticut. 1939.
Hawley, Ralph C. Connecticut. 1942.
Heintzleman, B. Frank. Alaska. 1951.
Holmes, J. S. North Carolina. 1939.
Hosmer, Ralph S. New York. 1932.
Hunt, George M. Wisconsin. 1951.

Illick, Joseph S. New York. 1946.
Isaac, Leo A. Oregon. 1953.

Jeffers, Dwight S. Oregon. 1948.

Kaufert, Frank H. Minnesota. 1955.
Keen, Frederick P. California. 1955.
Kelley, E. W. California. 1949.
Kellogg, Royal S. Florida. 1949.
Kinney, Jay P. New York. 1942.
Kittredge, Joseph. California. 1953.
Korstian, Clarence F. North Carolina. 1942.
Krueger, Myron E. California. 1951.

Lowdermilk, Walter C. California. 1948.

MacDonald, G. B. Iowa. 1944.
Marckworth, Gordon D. Washington. 1955.
Marsh, Raymond E. District of Columbia. 1948.
Martin, Clyde S. Washington. 1948.
Mason, David T. Oregon. 1948.
McArdle, Richard E. District of Columbia. 1953.
Metcalf, Woodbridge. California. 1953.
Morrell, Fred W. Virginia. 1951.
Munger, Thornton T. Oregon. 1946.
Munns, Edward N. California. 1949.

Preston, John F. District of Columbia. 1948.
Price, Jay H. Arizona. 1951.

Schmitz, Henry. Washington. 1940.
Shirley, Hardy L. New York. 1951.
Show, S. B. California. 1948.
Siecke, E. O. Texas. 1946.
Sparhawk, William N. New Hampshire. 1946.

Watts, Lyle F. Oregon. 1946.
Winslow, C. P. Washington. 1942.
Wirt, George H. Pennsylvania. 1948.

Ziegler, E. A. Pennsylvania. 1949.

Gulf States Section Holds Annual Meeting

The annual meeting of the Gulf States Section was held May 9 and 10 at New Orleans in the Jung Hotel. About 300 members, their ladies, and guests were in attendance.

The first technical session was called to order by W. M. Palmer, Jr., Section chairman. Charles H. Lewis, Jr., presided as moderator.

Among the speakers were DeWitt Nelson, president of the Society, A. W. Nelson, P. C. Wakeley, and W. F. Mann, Jr.

At the luncheon on May 10, Henry Clepper, executive secretary, discussed the need for recruitment of forestry students.

For the second technical session, M. A. Collet was moderator. Among the speakers were J. W. Johnson, R. J. Seidel, N. W. Sentell, P. M. Garrison, and T. E. Bercaw.

I. F. Eldredge, Sr., was toastmaster at the annual dinner. The entertainment was provided by Justin Wilson, well-known Cajun humorist.

New officers were installed as follows: chairman, James W. Craig, Jackson, Miss.; vice chairman, Jack S. Cooper, Meridian, Miss.; and secretary, Ralph R. Robertson, State College, Miss.

Coming Events

Allegheny Section

The summer meeting of the Allegheny Section will be held at the Potato City Hotel, on U. S. 6 between Coudersport and Galeton, Pa., on August 1, 2, and 3.

Northeastern Forest Tree Improvement Conference

The Northeastern Forest Tree Improvement Conference will be held in Orono, Maine, August 22 and 23.

Soil Conservation Society

The Soil Conservation Society of America will hold its 12th annual meeting August 28-31, 1957, at Asilomar Beach State Park, Pacific Grove, Calif.

National Watershed Congress

The National Watershed Congress is scheduled for September 23-25 in the Biltmore Hotel, Atlanta, Ga.

American Forestry Association

The 82nd annual meeting of the American Forestry Association will be held September 30-October 3, at Madison, Wis. Theme: "Wood Products on Parade."

Society of American Foresters

The 57th annual meeting of the Society of American Foresters will be held November 10-13, 1957 in the Syracuse Hotel, Syracuse, N. Y.

Keith Chapin Birdsall (1924-1957)

Keith Chapin Birdsall, assistant professor of forestry, Mississippi State College, died May 16 in Starkville, Miss., at the age of 33, after a four weeks' illness.

He was born in Burlington, Vt. and was a graduate of the University of New Hampshire and of the State University College of Forestry at Syracuse University.

Arthur P. Wood (1895-1957)

Arthur P. Wood died suddenly May 6 in Philadelphia, Pa. at the age of 62.

At the time of his death Mr. Wood was employed by the Pennsylvania Railroad. He had been with the company since 1920.

Born in Branford, Conn., January 17, 1895, he graduated from Yale University with a Ph.B. degree in 1916 and received an M.F. degree from Yale in 1920.

Henry Bull (1905-1957)

Henry Bull of New Orleans, La., died of a heart ailment April 4 at his home. He was 52 years of age.

Mr. Bull worked as a silviculturist at the Southern Forest Experiment Station from 1930 until 1950 when he retired on disability. He was the author of many publications dealing with thinning of southern pines.

He was born February 28, 1905 in New York City. He received his B.S. degree in 1928 from Yale (Sheffield Scientific School) and his M.F. degree in 1929, also from Yale. He had been a member of SAF since 1930.

Washington Section Announces New Officers

The Washington Section of the SAF, which holds monthly evening meetings during the autumn, winter, and spring months, held its final meeting of the past season on May 16. Mr. Wolfgang Koehler, forestry secretary of the German Embassy in Washington, addressed the group. He described the forest situation and forestry in Germany and noted interesting contrasts and parallels with forestry in the U.S.

The results of a mail ballot election of officers for the coming year was announced. They are as follows:

Chairman—C. B. Webster, Corps of Engineers, U.S. Army.

Vice Chairman—Glenn A. Thompson, Division of Fire Control, U.S. Forest Service.

Secretary-Treasurer — Charles H. Stoddard, Resources for the Future.

Intermountain Section Meets

The annual winter meeting of the Intermountain Section was held in Ogden, Utah on April 26 and 27. Total attendance of members and guests was nearly one hundred.

At the business session, with Chairman George V. Hjort presiding, the members discussed plans for the na-

reforesting the land to produce more wood for tomorrow...

Some of America's most distinctive homes are built of western red cedar. This wood species is one of many marketed under the Weyerhaeuser 4-Square lumber trademark.

It is the forestry policy of this company to properly manage its tree-growing lands so that they will be productive... forever. On these timber lands, trees are being grown in repeated crops under scientific forestry practices that provide for prompt reforestation of all harvested areas.

By careful planning of mature-tree seed sources, about 85 per cent of all harvested lands are restocked by nature. In areas where the seed crop has failed, new trees are being established through the use of artificial methods... such as hand planting and aerial seeding.

To date, about 33 million seedlings have been planted on 50,000 acres. An additional 50,000 acres have been seeded by helicopter or treated for rodent and brush control to facilitate new tree growth. During 1956, we collected and removed seed from 43,000 bushels of cones and began growing about 10 million new seedlings in forest nurseries for future planting.

By such intensive restocking programs, based on good forestry, our tree farms can supply present and future generations with a continuous flow of wood... for use as lumber, plywood, pulp and other forest products. *Write us at Box A, Tacoma, Wash., for free booklet,* ***Promise of the Trees.***

Weyerhaeuser Timber Company

making wood serve America better through good forest management

WEYERHAEUSER
4-SQUARE

tional SAF meeting, scheduled to be held in Salt Lake City, September 28-October 1, 1958.

The Section's dinner, preceded by a social hour, was served in the Ben Lomond Hotel. Vice Chairman Henry Camp was toastmaster. Henry Clepper discussed the crisis in forestry education and urged the Section members to help recruit qualified high school graduates for education in forestry.

The Section's technical session's theme was "Forestry Industry Looks Ahead" and featured three speakers: R. V. Hansberger, president of the Boise Payette Lumber Company; S. Blair Hutchinson, economist for the Intermountain Forest and Range Experiment Station; and E. S. Kotok, chief of the Station's Forest Utilization Service.

Francis H. Eyre Joins SAF Staff on Forest Service Retirement

F. H. Eyre retired as chief of the Division of Forest Management Research for the Forest Service on April 30, after 4½ years in that position and 35 years with the Service.

A native of Little Valley, N. Y., Mr. Eyre received his professional training at Cornell University and the University of Michigan, from which he received a B.S. degree in Forestry in 1922.

He was first employed as a forest assistant on the Humboldt National Forest in Nevada and the Boise National Forest in Idaho. Later he was junior forester on the Salmon National Forest in Idaho; assistant forest supervisor on the Wasatch National Forest in Utah; and associate silviculturist in the old Division of Silvics in Washington, D. C.

In 1931 Mr. Eyre went to the Lake States Forest Experiment Station where he headed up the Division of Forest Management Research between 1939 and 1952. In 1951 he was given the Department of Agriculture Superior Service award for "outstanding accomplishment and leadership in research in forest management."

Commencing in June, Mr. Eyre joined the staff of the Society of American Foresters on a part-time basis. He is engaged currently in handling the production end of publication of *Forest Science* and in assisting in the revision of the book *Forestry Terminology*.

FRANCIS H. EYRE

Puget Sound Section Has Field Trip

About 115 foresters participated in a field trip May 4 sponsored by the Puget Sound Section. The trip was held in the area of the old Yacolt burn in southwest Washington and was designed primarily to show the progress being made in rehabilitating the area which has been unproductive as a result of destructive fires.

Points of interest included in the trip were fertilization plots of the Weyerhaeuser Timber Company and the Larch Mountain Honor Camp where inmates of the state's correctional institutions are assigned with minimum custody and are given fire fighting training and work at brush clearance and re-forestation.

Representatives of the Forest Service, the Washington Department of Natural Resources, Crown Zellerbach Corp., Columbia River Paper Mill, Weyerhaeuser Timber Company, and the city of Camas conducted the tours.

Florida Chapter Members To Purchase Forest Lands

Members of the Florida Chapter have formed the Foresters' Silvic Corporation, Tallahassee, Fla., for the purpose of purchasing forest land to be managed by the foresters themselves. Capital stock in the corporation is being offered to Chapter members.

The following were elected to the

Twenty-Sixth
PANAMA
Anniversary

- B. B. Fan Drive Pumps
- B. B. Slip-on Units
  Pump and Engine
- Slip-on Units Complete
  Pump, Engine, Tank, Completing Materials, All on Steel Skids
- Compensating By-passes
- High Pressure Hose
- Pistol Grip Cut-offs
- Combination nozzles
- Vacuum Lift Systems
- Automatic Float Valves
- Tree Marking Guns
  Pressure Type
- Pyramid Drip Torches
  With Preheating Burner
- Flame Guns
- Angle Gauges
  For Estimating Basal Area

Write For Free Catalog
PANAMA PUMP CO.
P.O Box 689
Hattiesburg, Mississippi

TREES FOR FOREST PLANTING
PINE·SPRUCE
We have grown Pine, Spruce and other conifers for 50 years.
KEENE FORESTRY ASSOCIATION
BOX 378, KEENE, NEW HAMPSHIRE

METEOROLOGICAL SERVICE
Fire Danger Rating . . . Weather Modification
Forecasts and Advisories . . . Instruments
J. B. "Ben" Melin — 2806 32nd Ave., S. Seattle 44, Wash.
R. Kirkpatrick — 1805 N.E. 141st Ave. Portland 20, Ore.

SILVA COMPASS
Simpler — More Accurate
Recommended by foresters for cruising. Easier to use, faster, positive. Direct course readings. *Write for free literature and instructions.*
SILVA, INC., Dept. J, La Porte, Ind.
RANGER MODEL

For over ten years
a dependable source
for
Southern
Pine
Seed
SOUTHERN SEED COMPANY INC.
Baldwin, Georgia

Board of Directors: Rex Harper, Florida Forest Service, Tallahassee, president; K. R. Swinford, University of Florida, Gainesville, vice president; Gene Gemmer, Florida Forest Ranger School, Lake City, secretary-treasurer; and Robert Willis, St. Mary's Kraft, Lake City, and R. A. Bonninghausen, chief of management, Florida Forest Service, directors.

Membership Advancements

Confusion exists in the minds of some members regarding advancement in membership grades. Any qualified member may make *application* for advancement. It is not necessary that he be nominated or that the Section initiate his application.

Requirements for advancement are outlined in detail in the Society's Constitution and Bylaws. For the information of all members these requirements are briefly outlined below.

Student Member to Junior Member. Student Members are eligible for advancement to the Junior grade, immediately upon graduation. In applying for Student Membership, they, in effect, apply for advancement to the Junior grade as soon as they meet the requirements. Inasmuch as Student Members are automatically advanced, when qualified, application need not be made for advancement.

Affiliate Member (Class A) to Junior Member. The Class A Affiliate Member is one who graduated in forestry from a nonaccredited school. The only additional requirement for advancement to the Junior Member grade is two years of qualifying experience since his election to the Affiliate grade. (Note that this is since election to the Affiliate grade, not two years since graduation.) In other words, a Class A Affiliate Member who graduated in forestry from a nonaccredited school and became a member in 1955 might well qualify within a few months for advancement to the grade of Junior Member if he meets the requirements of "qualifying experience." "Qualifying experience" means employment in forestry work which may be broadly interpreted to include forest management and the growing of forest crops, procreation, erosion control work definitely tied into forest or wildland management, and utilization if it has a definite relationship to growing forest crops.

The Class B Affiliate Member is one who entered the Society on the basis of experience alone or experience plus some professional forestry education. Two years additional of qualifying experience in forestry since his election to Affiliate Membership, is required but more specifically, evidence that the candidate has the equivalent of an education of a forestry school graduate. In other words the applicant's qualifying experience must show that, during his total experience, he has gained the knowledge of all the basic courses which must be included as a minimum in an approved curriculum in an accredited forestry school.

The *Class C Affiliate Member* is one who graduated from an accredited forestry school and majored in wood technology, wildlife management, or range management where these curricula did not include all the five professional forestry courses. The only additional requirement for the advancement to Junior Member is two years qualifying experience since being elected to the Affiliate grade.

Regular advancement from Junior to Member. The applicant for regular

READY JULY 1, 1957!

An Annotated Bibliography on

CALIFORNIA COAST REDWOOD

More than 2,000 citations; 288 pages. Classified under History, Botany, Forestry, Lumbering, Recreation and Parks.

Includes Author's Index and cross-referenced Subject Index.

FOUNDATION for AMERICAN RESOURCE MANAGEMENT

582 MONADNOCK BUILDING
SAN FRANCISCO 5, CALIFORNIA

Price $7.50, postpaid, to accompany order

SAFEST, SIMPLEST DRIP TORCH YOU CAN USE

FORESTER Seal-Tite Torch

Provided with fuel trap, check valve and flash-back screen to protect you from explosion hazards.

Welded tank with cushion base, double bottom, oil proof gaskets and tight valves SEALTITE against leakage.

No Pressure—No Preheating. Burns diesel oil, stove oil or mixed fuels with low flash-point.

Approved for use by U. S. Forest Service

Manufactured By

WESTERN FIRE EQUIPMENT CO.
69 Main St. San Francisco, California

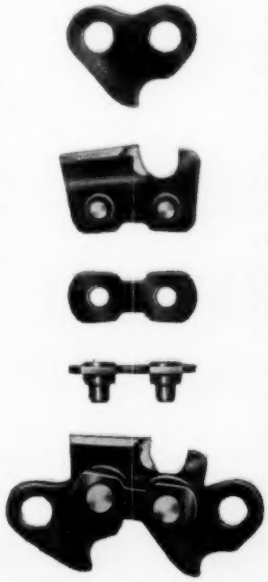
. . . It's *ALL* NEW

From the raw materials to actual performance in the field, Blue Jet Chain is *completely new.*

Designed to more exacting specifications and manufactured to closer tolerances, the new Blue Jet Chain is the answer to a *faster cutting — longer wearing chain,* for every make of chain saw.

Blue Jet Chain with less maintenance and less breakage provides you with the maximum in operating economy.

You need and want the best chain . . . Blue Jet.



GUIDE LINK
Shaped for proper sprocket fit. Reamed, precision fitted rivet holes eliminate stretch.

ROUTER
Precision ground, chrome plated high grade steel means longer life, less sharpening.

SIDE LINK
Designed with ample riding area to reduce bar wear, and with precision fitted rivet holes to eliminate chain stretch.

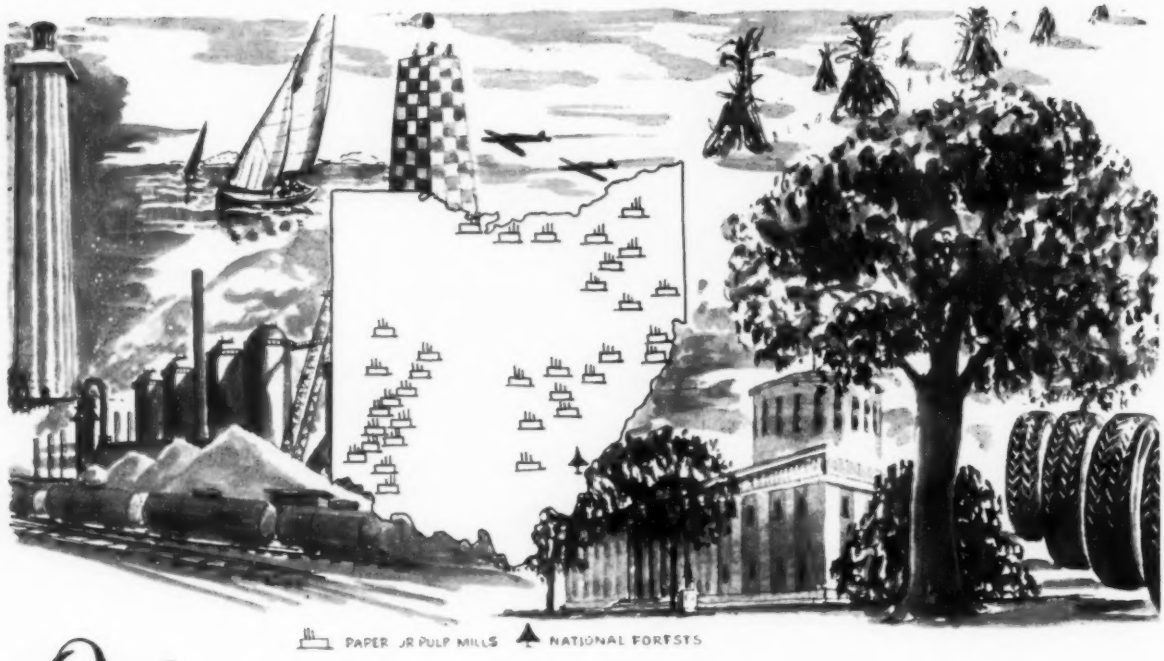
RIVET
Large countersunk head, hardened bearing surface, precision tolerances maintain chain tightness.

ASSEMBLED
The fastest cutting, smoothest running chain on the market today.

BLUE JET CORPORATION

Hopedale, Mass., U.S.A., a Subsidiary of Draper Corporation

No. 33 of a series featuring forestry practices, projects and products . . .



Ohio

According to latest figures, Ohio has about five million acres of forest land. The density of forest cover varies from 4 percent in Fayette County to 68 percent in Vinton County. Eastern and southern Ohio contain the western extension of the Appalachian plateau which is an unglaciated region of steep hills frequently too rugged for successful agriculture. This hilly land, once cleared for farming, but now abandoned, is reverting to tree growth and thereby increasing the total forest area.

Most Ohio soils produce hardwood timber of excellent quality. Managed stands produce 250 board feet per acre per year with exceptional sites producing 400 or more feet.

The most serious hazards to tree growth in Ohio are grazing, diseases, fire and insects, in that order. About half of all farm woods are grazed, many very heavily. Fires are promptly suppressed by State Division of Forestry personnel, except during very adverse weather. The area of woods burned per year frequently drops below .1%.

Most of the timber is in private ownership, although there are 18 state forests having a total area of 152,000 acres. The Wayne National Forest contains 88,000 acres. Most public forests are in southern Ohio. There are 14 farm foresters employed to assist private timber land owners in the management of their woods. These men also assist in the distribution of some 15,000,000 trees distributed from the three state nurseries.

Ohio's forests furnish raw material for three pulp mills, three handle factories, furniture plants and a host of other products.

The concentration of stumpage in and adjoining state-owned forests will probably attract other wood-using industries to Ohio in the future.

OHIO DIVISION OF FORESTRY—*contribution to this series does not necessarily constitute endorsement of* SOUTHERN GLO *products.*

Control, an important function of the forester, is also an important factor in producing SOUTHERN GLO forestry paints. Ingredient quality and quantity, mixing, processing . . . even packaging . . . all affect paint performance. And because we are proud of the mark SOUTHERN GLO paints have made for themselves, we leave nothing to chance. Ready-mixed, paint paste, boundary paint . . . every gallon of SOUTHERN GLO is produced in our own plant. Whether you order from your forestry supply dealer, from the Sumter (S.C.) or the New Orleans plant . . . you get the same quality product each time.

SOUTHERN COATINGS AND CHEMICAL CO. Dept. 2, Sumter, South Carolina—New Orleans, La.

advancement must meet three basic requirements: (1) at least three years of qualifying experience after first becoming eligible for election to the Junior grade, (2) actively engaged in forestry work, (3) demonstrated competence as a professional forester. Please note that the date of his election to Society membership is immaterial. Normally an applicant for regular advancement to the grade of Member will qualify three years after graduating from an accredited school of forestry. He must, of course, meet the two other requirements.

All the above applications for advancement must be supported by statements of endorsement from three voting members and show Section endorsement.

Members qualified for advancement are urged to apply now. Application forms can be obtained from your Section officers or the Society's office, 425 Mills Building, Washington 6, D. C.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of May are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of August 1, 1957. Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Junior Grade

Bennett, R. L., Service Forester, Pa. Dept. of Forests & Waters, Fayetteville, Pa.; Pa. State, B.S.F., 1956.

Dunn, W. B., Partner, Dunn Bros. Lbr. Co., Warren, Pa. Reinstatement.

Irwin, W. A. C., Asst. Dist. Forester, Md. State Dept. of Forests & Parks, Grantsville, Md.; Univ. of Toronto, B.S., (Forestry), 1951. (Affiliate 1954).

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY

Ache, R. K.	Peace, M. R.
Baldwin, R. C.	Posca, D. L.
Blankenbeker, R. C.	Rygwalski, E. D.
Breslin, T. A.	Seesholtz, D. H.
Davidson, K. A.	Seitz, R. C.
DeBald, P. S.	Seman, T. R.
Erbeck, W. A.	Sikorski, M.
Fry, F. L.	Sones, V. B.
Galvin, N. J.	Steward, D. L.
Hess, W. L.	Terry, R.
King, H. W.	Uivary, J. S.
Lease, R. E.	Voelker, R. M.
Lockard, W. H.	Weimer, G. T.
Marchetti, M. A.	Wenner, R. P.
Mortimer, C. R.	Whitfield, C. L.
Paxton, W. C.	Wright, A. E.

Member Grade

Berthy, H. P., Extension Forester, W. Va. Univ., Morgantown, W. Va.; W. Va. Univ., B.S.F., 1950. (Junior 1951).

Darrach, A. G., Asst. Forester, State of N. J., Trenton, N. J.; Pa. State, B.S.F., 1950; Yale, M.F., 1953. (Junior 1951).

Gillespie, W. H., Oak Wilt Coordinator, W. Va. Univ., Charleston, W. Va.; W. Va. Univ., B.S.F., 1952; M.S, (Botany), 1954 (Junior 1952).

Grisez, T. J., 14 E. Walnut St., Kingston, Pa. (Junior 1950).

Myers, J. H., Soil Conservationist, Soil Cons. Service, Princeton, W. Va. Reinstatement.

Nagy, W., 513 Maxwell Drive, Titusville, Pa. (Junior 1950).

Wilce, J. C., Asst. Dist. Forester, Md. Dept. of Forests & Parks, Salisbury, Md.; Pa. State, B.S.F., 1952. (Junior 1952).

Appalachian Section

Junior Grade

Students Eligible for Automatic Advancement

DUKE UNIVERSITY

Bethune, J. E.	Lewis, G. D.
Calkins, C. S.	McGee, C. E.

NORTH CAROLINA STATE COLLEGE

Adams, S. M.	Norwood, R. G.
Asher, W. C.	Parker, J. R.
Butler, G. L.	Pickenheim, P. J.
Dowless, V. G.	Stevens, W. R.
Emory, J. B.	Stevenson, J. C.
Gibbs, G. S.	Tayloe, R. P.
Hudson, S. T.	Taylor, S. A.
Norton, C. R.	Webb, C. D.

White, M. J.

Member Grade

Cousins, C., Forester, Seward Luggage Mfg. Co., Inc., Petersburg, Va.; N. C. State, B.S.F., 1951. (Junior 1951).

Evans, J. T., Forester, The Mead Corp., Sylva, N. C.; N. C. State, B.S.F., 1950. (Junior 1951).

Price, D. H., Forester, Canal Wood Corp., Chester, S. C.; N. C. State, B.S.F., 1950. (Junior 1952).

Vimmerstedt, J. P., Research Forester, Southeastern Forest Expt. Sta., Asheville, N. C.; State Univ. of N. Y., B.S.F., 1953. (Junior 1953).

Affiliate Grade

McLees, J. R., Fire Control Engr., S. C. State Comm. of Forestry, Sumter, S. C. Reinstatement.

Central Rocky Mountain Section

Student Grade

COLORADO STATE UNIVERSITY

Barner, M. V. Jeglum, C. P.

Junior Grade

Students Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY

Baer, R. G.	James, J. M.
Bunner, R. O.	LaBau, V. J.
Crews, D. L.	Mosier, R. E.
Daniels, O. L.	Roberts, T. D.
DeBerard, D. J.	Smedley, F. P.
Fullinwider, J. A.	Thompson, J. R.
Hoerber, G. F.	Underwood, W. L.
Hunt, W. H.	Weaver, P. N.

Yerkes, V. P.

Member Grade

Alexander, R. R., Forester, Rocky Mtn. Forest & Rge. Expt. Sta., Ft. Collins, Colo.; Colo. State Univ., B.S.F., 1951. (Junior 1952).

Central States Section

Junior Grade

Huston, S. L., Farm Forester, Ill. Div. of Forestry, Oregon, Ill. Reinstatement.

Member Grade

Idleman, M. K., Dist. Forester, Ohio Div. of Forestry, New Philadelphia, Ohio; Utah State Univ., B.S.F., 1950. (Junior 1951).

25 MILLION SEEDLINGS
McCURDY BROS. NURSERIES
MANTON, MICHIGAN

PLANTING TREES ?
Use a "FORESTER" or "CONSERVATOR" Planter
Complete information on request
UTILITY TOOL & BODY CO.
Clintonville, Wis.

CHRISTMAS TREES
OR FOREST TREES
Turn wasteland into profit. Our famous Christmas Tree Growers' Guide tells you how. Write for free copy.
FREE Catalog
MUSSER FORESTS. Box 26-G Indiana, Pa.

NEW REGULATION FIELD CLOTHES
for
U. S. FOREST SERVICE PERSONNEL
Complete Price List on Request
THE FECHHEIMER BROS. CO.
UNIFORMS FOR OVER 75 YEARS
CINCINNATI 2, OHIO

TO GET ALL THESE SAVINGS

In TIME, PAINT, and MONEY

NOZZLE CAP
To prevent paint drying-in — Another Nelson exclusive, saves nightly cleaning.

REVERSIBLE NOZZLE
To eject plugs quickly, cuts "time out" to clear clogged guns.

ADAPTOR AND QUART CAN
Permits screwing can direct to gun — eliminates funnels, canteens and sloppy paint transfers.

NON-SETTLING PAINT
Saves hours wasted in stirring — makes marks that endure and twice as many per gallon.

USE BOTH THE NEL-SPOT GUN and NELSON TREE MARKING PAINT

Both save time. Both save paint. Use them together and Nelson's Paint-Can-Gun, "all 3 in one," mark more trees for less money than any other combination of paint and marking tools you can buy.

WRITE — Dept. JF-11

THE NELSON COMPANY
1236 Prospect Avenue
Iron Mountain, Michigan

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Hahn, T. T. — Holder, J. B.
Harsey, W. W. — Koten, D. E.
Marshall, M. E.

Junior Grade

Crumb, D. J., 3050 Larson Ave., Salem, Ore. Reinstatement.

Madson, D. R., Unit Forester, Bur. of Land Mgmt., Salem, Ore.; Iowa State, B.S.F., 1948.

Phillips, J. G., Forester, Ore. State Board of Forestry, Coos Bay, Ore.; Ore. State, B.S.F., 1950.

Member Grade

Lellelid, H. R., Piling Buyer, Pope & Talbot, Inc., St. Helens, Ore.; Mont. State, B.S.F., 1951. (Junior 1951).

Logan, J. F., Forester, Cascade Lbr. Co., Goldendale, Wash.; Colo. State Univ., B.S.F., 1948; M.F. 1949. (Junior 1950).

Miles, W. R., Forester, Weyerhaeuser Tbr. Co., Sutherlin, Ore.; Univ. of Minn., B.S.F., 1949. (Junior 1953).

Gulf States Section

Junior Grade

Berkley, R. L., Tbr. Estimator, Johns-Manville Corp., Bude, Miss. Reinstatement.

Palmer, W. M., 2042 Lee Drive, Baton Rouge, La. Reinstatement.

Waller, R. E., Logging Supt., The Lutcher & Moore Lbr. Co., Orange, Texas; Stephen F. Austin State College, B.S., (Forestry), 1948. (Affiliate 1953).

Students Eligible for Automatic Advancement

LOUISIANA POLYTECHNIC INSTITUTE

Faircloth, C. A. — Rowell, C. D.
White, M. H.

LOUISIANA STATE UNIVERSITY

Broom, E. D.

Member Grade

Finger, G. P., Pine Silviculturist, Gaylord Container Div., Crown Zellerbach Corp., Bogalusa, La.; Purdue, B.S.F., 1951. (Junior 1951).

Rosdahl, D. V., Forester, USFS, Winnfield, La.; Univ. of Minn., B.S.F., 1953. (Junior 1953).

Affiliate Grade

Bradford, J. M., Dist. Forester, A. K. Dexter, Corinth, Miss.; Ark. A & M, B.S., (Forestry), 1954.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Bower, D. R. E. — Osborn, F. G.
Bruckner, R. A. — Ragan, R. E.
Coats, R. T. — Roberts, R. B.
Hronek, B. B. — Schuldt, A. T.
Smithey, G. G.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF IDAHO

Berscheid, G. H. — Krinard, R. M.
Blake, G. M. — Krueger, K. W.
Christiansen, N. B. — Newman, R. J.
Cole, G. F. — Schwab, J. R.

3 WORKHORSES for FIRE FIGHTING FORESTERS

FZZ .... FZ .... HPZF

These 3 HALE Centrifugal Portable Pumping Units can give you the range of volumes and the pressure you need for a wide variety of fires.

All three "Workhorse" units are conveniently portable by two men; can be easily mounted or carried on any type of apparatus or truck for fighting fires while in motion from booster tank; often used to pump from inaccessible water source into major pumper, or to fight fires direct through long lines of hose.

	U. S. Gallons Per Minute	Disch. Press. Lbs. Per Sq. In.
*FZZ	60	90
	100	70
FZ	50	60
	300	10
HPZF	15	200
(Pictured at top)	45	100

*FZZ now has NEW—Ball-Type Discharge Valve—Improved Priming

Write today for circulars. Ask for a Demonstration; no obligation.

HALE FIRE PUMP COMPANY
Conshohocken, Pa.

Fellows, L. A. Whittig, J. F.

Intermountain Section

Junior Grade

Kotok, E. S., Intermountain Forest & Range Expt. Sta., Ogden, Utah. Reinstatement.

Students Eligible for Automatic Advancement

UTAH STATE UNIVERSITY

Sikorowski, P. P. Williams, G. C.

Kentucky-Tennessee Section

Junior Grade

Hampton, L. A., Forester, TVA, Paris, Tenn. Reinstatement.

New England Section

Student Grade

UNIVERSITY OF MAINE

Burchard, D. B. Seaward, W. P.
Finch, R. B. White, J. B.
Metzger, R. H. Wiklune, R. P.

Junior Grade

Powell, L. M., Operations Inspector, Great Northern Paper Co., Old Town, Maine. (Affiliate 1954).

Students Eligible for Automatic Advancement

UNIVERSITY OF MASSACHUSETTS

Bouchard, P. H. McCaskie, D. G.
Carlson, K. L. Morrison, W. A.
Coughlin, J. W. Percy, T. F.
Hinkley, R. D. Rivers, R. J.
Knudtson, E. L. Romancier, R. M.
Lane, L. E. Schruender, B. J.

YALE UNIVERSITY

Blum, B. M. Hoffman, B. F.
Blumenstock, M. W. Hogan, R. H.
Cobleigh, H. N. Johnson, A. W.
Dierauf, T. A. Mills, B. B.
Heist, L. C. Schultz, R. B.
Hoadley, R. B. Ticknor, W. D.

Member Grade

Beal, F. S., Forester, International Paper Co., Phillips, Maine; Univ. of Maine, B.S.F., 1952. (Junior 1952).

Affiliate Grade

Larson, J. S., Research Asst., Univ. of Mass., Amherst, Mass.; Univ. of Mass., B.S., (Wildlife Mgmt.), 1956.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Towner, T. L.

Junior Grade

Morris, A. S., Forester, Shoosplin Woods Ltd., Pembroke, Ont., Canada; Univ. of Toronto, B.S., (Forestry), 1951. (Affiliate 1952).

Students Eligible for Automatic Advancement

STATE UNIVERSITY OF NEW YORK

Harford, L. B. Zeh, B. E.

Northern California Section

Junior Grade

Lampi, E. H., Supv. Park Ranger, Lassen Volcanic Natl. Park, Manzanita Lake, Calif.; Mich. College of Mining & Tech., B.S., (Forest Mgmt.), 1950. (Affiliate 1953).

Stevenson, S. R., Forester, USFS, Eureka, Calif.; Univ. of Calif., B.S.F., 1938.

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Bemis, W. P. Johnson, D. E.
Benediktson, J. B. Kolkmann, O. J.
Benseler, R. W. Lewis, R. T.
Bruni, R. L. Owen, D. W.
Cline, R. A. Petersen, J.
Coburn, J. N. Schaefer, C. H.
Cooper, G. D. Schlumpf, W. E.
Ferrin, D. L. VanWyck, S. M.
Fores, R. B. Weinmann, R. G.
Hayden, D. W. Whitacre, J. E.
Hosler, D. E. Winton, L. L.
Zachry, J. D.

Member Grade

Anderes, H. F., Kings Canyon Natl. Park, Calif. (Junior 1950).

Barker, W. K., Dist. Forester, Bur. of Land Mgmt., Redding, Calif. (Junior 1950).

Beard, T. J., Forester, USFS, Bridgeville, Calif. (Junior 1951).

Bruton, Q. H., Tbr. Sales Supv., Shasta Forests Co., Fall River Mills, Calif. (Junior 1950).

Carr, S. B., Forester, Gualala Redwoods, Gualala, Calif. (Junior 1950).

Flynn, J. V., Forest Mgmt., Box 770, Willows, Calif. (Junior 49R55).

Herbert, F. R., Fire Control, Calif. Div. of Forestry, Sacramento, Calif. (Junior 1950).

Houghton, H. A., Forester, Willits Redwood Products Co., Willits, Calif. (Junior 1950).

Jacobson, C. H., Asst. Dist. Ranger, USFS, Mt. Hebron, Calif.; Ore. State, B.S.F., 1951. (Junior 1951).

Mullen, A. H., Dist. Ranger, Eldorado Natl. Forest, Tahoe Valley, Calif. (Junior 1950).

Norman, K. P., Dist. Ranger, USFS, Paskenta, Calif. (Junior 1950).

Nyholm, E. J., Logging Supt., Robinet Logging Co., Crescent City, Calif. (Junior 45R55).

O'Keefe, J., Assoc. Dist. Ranger, USFS, Berry Creek, Calif. (Junior 1950).

Parkinson, J. N., Asst. Ranger, Sierra Natl. Forest, Big Creek, Calif.; W. Va. Univ., B.S.F., 1950. (Junior 1952)

Pierson, E. W., Asst. Prof., Humboldt State College, Arcata, Calif.; Ore. State, B.S.F., 1952; M.F., 1954. (Junior 1952).

Prentice, D. C., Dist. Forest Engr., Western Pine Assoc., Redding, Calif. (Junior 1950).

Radcliffe, W. A., Box 325, McCloud, Calif. (Junior 1950).

Rappleye, R. E., Calif. Div. of Forestry, Fort Bragg, Calif (Junior 1950).

Ring, R. L., Logging Mgr., Feather River Pine Mills Co., Feather Falls, Calif. (Junior 1950).

Summerly, J. J., Forest Tech., Calif. Div. of Forestry, Garberville, Calif. (Junior 1950).

Ward, G. A., USFS, Stonyford, Calif. (Junior 1950).

Watt, J. C., Dist. Ranger, Trinity Natl. Forest, Mt. Shasta, Calif. (Junior 1950).

Wyckoff, P. J., Research, USFS, Soda Springs, Calif. (Junior 1950).

Affiliate Grade

Peterson, E. M., Asst. State Forest Ranger, Calif. State Div. of Forestry, Mokelumne Hill, Calif.

Northern Rocky Mountain Section

Junior Grade

Hunter, R. D., Forester, USFS, Libby, Mont.; Wash. State College, B. S., (Forest Mgmt.), 1952. (Affiliate 1953).

Students Eligible for Automatic Advancement

UNIVERSITY OF MONTANA

Duhamel, E. E. Royce, A. G.
Jukkala, A. H. Sedlacek, B. G.
Poole, R. B. Smith, L. K.

Ozark Section

Junior Grade

Hegy, R. G., Dist. Forester, Dierks Forests Inc., Wright City, Okla.; Univ.

IMMEDIATE Service For Your Needs In —

SAFETY — CRUISING — MARKING — SCALING — MAPPING — PLANTING — FIRE FIGHTING — PRUNING — WEED AND BRUSH KILLERS — FIELD CALCULATORS — SLIDE RULES — SURVEYING.

Quality Products at Reasonable Costs.

"WILD" Theodolites—"CURTA" Hand Calculators—"BLUME-LEISS" Altimeter

The NEW Center for Complete Forestry Tools and Equipment

THE **BEN MEADOWS** CO.

Phone
CEdar 3-2601

Box 93, N.S. Station
Atlanta 5, Georgia

Proven Service

Consulting Foresters

Professional Services Offered by
Members of the Society of American Foresters

Land Surveyors *Consulting Forest Engineers*

BELANGER and BOURGET

86 MOUNTAIN HILL, QUEBEC,
P.Q., CANADA

Forest Surveys and Inventories. Establishing of boundary lines.

Forest Management and Logging plans. Locations for Wood industries.

POMEROY & McGOWIN

FOREST MANAGERS

Monticello, Arkansas Chapman, Alabama

KEITH CRANSTON, Forestry Consultant

Service to Industry — Personnel Placement

1. Listing of men available for jobs
2. Listing of jobs and employment possibilities

Leland, Mississippi — Headquarters in the Delta Hardwoods

A Southwide Professional Service

GEORGE BANZHAF & COMPANY

822 North Water Street MILWAUKEE 2 BRoadway 6-2062

Consultants to the Wood Using Industries

FOREST MANAGEMENT

Topographic Mapping
Timber Stand Maps
Land Classification

Forest Development Studies
Forest Inventories
Forest Appraisals

Hammon, Jensen & Wallen

MAPPING AND FORESTRY SERVICES

660 HEGENBERGER ROAD OAKLAND 21, CALIFORNIA

General Photogrammetric and Forestry Consulting Services

TIMBERLAND MANAGEMENT, INVENTORY AND APPRAISAL
—OVER 50 MILLION ACRES SINCE 1910

JAMES W. SEWALL COMPANY
FOREST ENGINEERS
OLD TOWN, MAINE

BRANCH: JAMES W. SEWALL CO. (CANADA) LTD., FREDERICTON, NEW BRUNSWICK

of Minn., B.S.F., 1952.
Wilkinson, W. B., Forest Technician, International Paper Co., Murfreesboro, Ark. Reinstatement.

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI

Allen, J. G.	Hawkins, R. H.
Arter, J. S.	Keyth, W. A.
Bell, L. W.	Poat, A. J.
Berlin, J. S.	Prante, H. J.
Carron, S. T.	Rivas, A. M.
Cole, A. B.	Schaller, G. T.
Eckles, G. W.	Seabaugh, J. T.
Ferell, R. S.	Slusher, J. P.
Ferrill, M. D.	Strauss, R. J.
Fisher, H. E.	Strickler, J. K.
Gwinner, M. W.	Tamm, J. N.
	Troutt, A. H.

Member Grade

Erwin, H. K., Forester, USFS, Mena, Ark. (Junior 1950).
Greenlaw, R. E., Asst. Ranger, USFS, Winona, Mo. (Junior 1950).
Hester, J. E., Dist. Forester, Dierks Forest Inc., Daisy, Ark. (Junior 1951).
McDonald, D. R., Asst. Dist. Forester, The Crossett Co., Hamburg, Ark. (Junior 1950).
Nelson, A. L. C., Forest Engr., Container Corp. of America, Brewton, Ala. (Junior 1950).
Sorensen, W. M., Asst. Dist. Forester, Dierks Forests Inc., Grannis, Ark.; Iowa State, B.S.F., 1951. (Junior 1951).
Taylor, R. F., Field Asst., International Paper Co., Benton, Ark.; Univ. of Mo., B.S.F., 1952. (Junior 1952).
Wehking, E. F., Rt. 2, Box 510, Pine Bluff, Ark. (Junior 1950).

Affiliate Grade

Gresham, B. G., Forester, Ark. State Forestry Comm., Booneville, Ark.; Ark. A & M, B.S., (Forestry), 1957.
Neeley, J. J., Box 181, Camden, Ark.; Ark. A & M, B.S., (Forest Mgmt.), 1956.

Puget Sound Section

Junior Grade

Haaland, C. J., Land Examiner, Weyerhaeuser Tbr. Co., Cosmopolis, Wash. Reinstatement.
Morrow, C. W., Forester, Cascade Lbr. Co., Ellensburg, Wash.; Univ. of Wash., B.S.F., 1956.
Rooney, P. E., Asst. Logging Engr., Fibreboard Products Inc., Port Angeles, Wash.; Ore. State, B.S.F., 1956.
Tait, R. I., Logging Engr. Asst., Scott Paper Co., Hamilton, Wash. Reinstatement.

Students Eligible for Automatic Advancement

UNIVERSITY OF WASHINGTON

Arneson, N. A.	Fagerberg, K. D.
Carey, W. W.	Olson, O. N.
	Scheuch, B. C.

Affiliate Grade

Bronson, J. D., President, Cascade Lbr. Co., Yakima, Wash.
Karau, D. T., Resident Forester, Rainier Forest Assoc., Elbe, Wash.
Keogh, E. J., Logging Accountant, Cascade Lbr. Co., Yakima, Wash.

Southeastern Section

Junior Grade

Barron, J. S., 1912 Pineleaf St., Montgomery, Ala. Reinstatement.

Freeman, E. M., Dist. Forester, Gulf States Paper Corp., Tuscaloosa, Ala. (Affiliate 1950).

Students Eligible for Automatic Advancement

ALABAMA POLYTECHNIC INSTITUTE

Bourns, P. H.	Mozingo, T. R.
Davis, R. G.	Plummer, G. M.
Farrar, R. M.	Savage, W. H.
Haynie, R. H.	Smith, C. D.
Huff, G. A.	Vilece, E. A.
Lynn, T. E.	Whitlock, G. W.

Williams, J. H.

UNIVERSITY OF FLORIDA

Eubank, G. H.	Leetch, T. A.
Gift, R. F.	Messerly, W. H.
Gould, H. C.	Phillips, H. J.
Haynes, C. W.	Sands, J.
Hemingway, H. M.	Taylor, V. A.

Whitacre, L. D.

UNIVERSITY OF GEORGIA

Alsup, J. D.	Jones, G. R.
Astin, J. S.	Jones, R. W.
Bacon, W. S.	Jordan, J. R.
Barber, B. P.	Knowles, P. C.
Beason, R. J.	Lee, T. S.
Berry, W. M.	Millians, W. D.
Bogett, J.	Palmer, A. N.
Burgess, J. M.	Potts, J. A.
Cherry, C. W.	Ridgeway, T. R.
Crumpton, D. N.	Roberts, M. N.
Davis, W. C.	Shuman, S. E.
Dillard, B. M.	Solomons, S. B.
Eason, J. T.	Steagall, W. A.
Forsyth, R. H.	Tomlinson, H. L.
Greene, J. P.	Warner, R. A.
Harden, H. B.	Whitfield, A. P.
Johnson, S. G.	Willard, W. K.

Yeager, G. L.

Member Grade

Bray, I. L., Consulting Forester, Self Employed, Marianna, Fla.; Univ. of Ga., B.S.F., 1950. (Junior 1951).

Engel, E. J., Dist. Forester, Ga. Kraft Co., Monticello, Ga.; N. C. State, B.S.F., 1950. (Junior 1951).

Gilmore, A. R., Asst. Forester, A.P.I., Auburn, Ala.; Univ. of Fla., B.S.F., 1949; Duke, M.F., 1950. (Junior 1951).

Lyle, E. S., Asst. Prof., A.P.I., Auburn, Ala.; Univ. of Ga., B.S.F., 1951; Duke, M.F., 1952. (Junior 1951).

Skuse, J. A., Forester, S. T. Strahan Co., Port Wentworth, Ga.; Univ. of Ga., B.S.F., 1952. (Junior 1952).

Affiliate Grade

Ray, L. A., County Ranger, Ga. Forestry Comm., Swainsboro, Ga.

Southwestern Section

Junior Grade

Benoit, A. L., Forester, Bur. of Indian Affairs, San Carlos, Ariz.; Univ. of Maine, B.S.F., 1949.

Wier, R. A., Forester, USFS, Flagstaff, Ariz.; Iowa State, B.S.F., 1951.

Member Grade

Carr, E. T., Forester, USFS, Willcox, Ariz. Reinstatement.

Affiliate Grade

Bolander, D. H., Forester, USFS, Globe, Ariz.; Utah State Univ., B.S. (Range Mgmt.), 1954.

Upper-Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Cooper, T. G.	Daniel, P. L.

Yargus, W. O.

Junior Grade

Students Eligible for Automatic Advancement

IOWA STATE COLLEGE

Omundson, F. L.	Quade, R. L.

Schwarte, M. K.

UNIVERSITY OF MINNESOTA

Bekeris, G. G.	Mecklenburg, K. F.
Chase, R. C.	Mellon, D. J.
Churchill, K. T.	Ohman, J. H.
Ginnaty, T. P.	Pinska, D. M.
Harthan, D. L.	Roessler, T. W.
Herbst, R. L.	Roles, J. P.
Jaquith, P. H.	Sandberg, G. W.
Johnson, R. E.	Schoberg, F. P.
Johnson, R. R.	Scott, D. H.
Knopp, T. B.	Solberg, C. T.
Kubitza, T. V.	Waring, R. H.
Manly, R. J.	Weissling, J. A.

Williams, R. W.

Member Grade

Umland, E. R., Work Unit Conservationist, Soil Cons. Service, Fessenden, N. Dak. Reinstatement.

Wisconsin-Michigan Section

Student Grade

UNIVERSITY OF MICHIGAN

Handorf, H. H.

Junior Grade

Students Eligible for Automatic Advancement

MICHIGAN STATE UNIVERSITY

Beuter, J. H.	Middlewood, H. B.
Dean, R. E.	Mitschelen, G. E.
Fenwick, D. P.	Rathbun, D. D.
Herring, H. G.	Riffle, J. W.
King, J. P.	Sachs, R. D.
List, J. R.	Vorce, R. W.

UNIVERSITY OF MICHIGAN

Barth, H. E.	Miller, J. A.
Hale, J. A.	Paller, W.
Lohrey, R. E.	Schultz, J. D.
Marks, R. W.	Truesdale, P. S.

Walter, R. J.

Foreign

Corresponding Grade

Ahmad, N., Deputy Conservator of Forests, Government of East Pakistan, Dacca, East Pakistan; Presidency College, B.S., (Botany), 1941; Indian Forest College, Diploma, 1944.

Liu, S. H., Senior Specialist, Taiwan Forestry Research Institute, Taipei, Taiwan; College of Agric. Natl. Peiping Univ., B.S., (Forestry), 1937.

Muniz, P. J. C., Chief of Forestry Div., State of Parana, Curitiba, Pr., Brazil; Agric. & Veterinary School of Parana, B.S., (Agronomy), 1957.

Yuan, R. H., Junior Specialist, Forestry Div., Joint Comm. on Rural Reconstruction, Taipei, Taiwan. Univ. of Nanking, B.S., (Forestry), 1949.

R. B. SHANNON & ASSOCIATES
KITTANNING, PA.
REGISTERED SURVEYING
CONSULTING FORESTRY
PHOTOGRAMMETRIC
CARTOGRAPHY
Phone: Kittanning 42-4941

PAUL T. WINSLOW
Consulting Forest Engineer
ESTIMATES—APPRAISALS—MANAGEMENT
STAATSBURGH-ON-HUDSON, N. Y.

ADIRONDACK FORESTRY, INC.
David E. Strong, Consultant
Estimates, Appraisals, Marketing
Management Plans, Tree Planting
Wood Preservation
WILMINGTON, NEW YORK

LOGGING COST ESTIMATES APPRAISALS
SURVEYS AND MANAGEMENT CRUISING
INTERMOUNTAIN TIMBER SERVICE
Know Your Timber Values and Logging Costs
THOMAS (Tom) C. CLIFTON Tel. 2-4300
Consulting Forester 4101 State St.
Boise, Idaho

POND & MOYER CO., INC.
Consulting Foresters
Estimates—Appraisals—Surveys
Machine Tree Planting Service
107 HOMESTEAD RD., ITHACA, N. Y.

FRANK J. LEMIEUX
Forester
833 WHITNEY BUILDING
NEW ORLEANS, LA.

TREE FARM MANAGEMENT SERVICE
1166-7th Avenue, West, Eugene, Oregon
Protection—Reforestation—Inventory
Utilization—Research
Verne D. Bronson, Chief forester, Phone 5-5371

NORTHERN TREE COMPANY
Professional Forestry Services
Thomas F. Schweigert, Pres.
Member, Association of Consulting Foresters
Penney Building
Petoskey Michigan

Reforestation Arboriculture
S. GAYLEY ATKINSON
Consulting Forester
Huntingdon Road
Huntingdon Valley, Pa.

THOMAS G. CLARK,
CONSULTING FORESTER
FOREST LAND MANAGEMENT CO.
P. O. BOX 1046
MORGANTOWN, W. VA.

FOREST PROPERTY
Estimates—Appraisals—Management
Prentiss & Carlisle Co., Inc.
107 Court Street Bangor, Maine

NAT'L. TIMBER CONSULTANTS
COMPLETE TIMBER SERVICES
SALEM, MISSOURI

ALBERT G. HALL
Forestry Relations Counsel
Consulting Forester
Member, Association of Consulting Foresters
810 18th St., N.W., Washington 6, D.C.

NORTHEAST FORESTRY SERVICE
STANLEY MESAVAGE, *Consultant*
Forest Management
Timber Production
Forest Products Marketing
HAWLEY PENNSYLVANIA

TIMBER MANAGEMENT SERVICE
J. E. HALL R. W. MEZGER
FORESTRY CONSULTANTS
Technical Assistance to Timberland Owners and Operators in the Ponderosa Pine Region
Klamath Falls, Oregon

PAUL M. SANDERS
Consulting Forester
916 YEON BLDG.
PORTLAND 4, OREGON
Telephone: CApitol 8-3536

Porcius F. Crank, Jr.
Consulting Forester
Point Harbor North Carolina

Forestry News

Foresters Honored by Service Awards

Dr. Richard E. McArdle, chief of the Forest Service, was one of eight people who received the Distinguished Service Award of the Department of Agriculture at the 11th annual honor ceremony in Washington, D. C. May 21. Secretary of Agriculture Ezra Taft Benson presented the awards.

Dr. McArdle was cited for "dynamic leadership and vision in meeting rapidly rising public use of national forests, in building and strengthening cooperative relations with States and industry, and in developing effective forest research."

Superior Service Awards were presented to 16 engaged in forestry work. They were Dr. William A. Campbell, Athens-Macon Research Center; Chester D. Cannon, Jr., Modoc National Forest; Leslie L. Colvill, Pacific Northwest Region; Floyd M. Cossitt, Southern Region; Alfred Russell Croft, Intermountain Region; Joe H. Eiswerth, Pike National Forest; Sanford M. Floe, Olympic National Forest; August L. Hormay, California Forest and Range Experiment Station; Arthur L. Kahl, Northern Region; Joseph D. Kobus, California Region; Francis B. Lufkin, Okanogan National Forest; Lorraine J. Markwardt, Forest Products Laboratory; George R. Phillips, Soil Conservation Service, Washington office; Carrow T. Prout, Jr., Soil Conservation Service, Mobile, Ala.; and Victor O. Sandberg, Northern Region; Dean H. Vinson, Tahoe National Forest; and Richard C. Wilson, Washington office.

Unit awards for superior service went to Division of Fiscal Control, North Central Region and Division of Forest Economics Research, Southern Forest Experiment Station.

Smokey Becomes Comic Strip Character

Columbia Features, Inc., through agreement with the U. S. Forest Service, in June began release of a daily and Sunday feature comic strip with Smokey Bear, symbol of federal and state forest fire protection activities, as the lead character.

WILLIAM E. TOWELL

Forester Heads Missouri Conservation Commission

William E. Towell, acting director of the Missouri Conservation Commission, was named to the position of director in April. Dan Saults, previously chief of the department's Information Section, was named assistant director.

Towell, except for duty with the U. S. Navy in World War II, has been with the Conservation Commission since 1938, in which year he graduated from the University of Michigan with both the Bachelor's and Master's degree. In the Commission's Forestry Division he progressively held the positions of district forester, farm forester, and assistant state forester in charge of fire control. Named assistant director of the Commission in 1956, he became acting director upon the retirement of I. T. Bode.

He is a past chairman of the Ozark Section of the SAF and a member of the Wildlife Society.

Nearly 7 Million Acres Contracted for Under Conservation Reserve of Soil Bank

With complete reports not then in, U. S. Department of Agriculture officials in May estimated that about 7 million acres were contracted for the Conservation Reserve of the Soil Bank under the program which closed for this year on April 15.

More than 500,000 acres to be planted to trees are covered by contracts

that have been reported to the Department. Most of the tree planting is to be done in the states bordering the Great Lakes and in the Southeast. In the Great Plains area there was a heavy sign-up of contracts calling for grassland plantings.

Concurrently it was learned that Soil Conservation Service Administrator D. A. Williams had taken steps to assure maximum efforts by the SCS in helping landowners improve wildlife habitat through specific practices included in the Conservation Reserve Program.

Nominations Open for Hoblitzelle Award

October 1, 1957 has been set as the deadline for submitting nominations for the Hoblitzelle Award for 1958. Nominations may be made by individuals, groups, or agencies.

The award, $5,000 in cash, will be presented May 21, 1958 to the scientist who has made the outstanding research contribution to American agriculture in the four year period January 1, 1953 through December 31, 1956.

The term "agricultural sciences" is interpreted to include agricultural chemistry and physics, agronomy, bacteriology, biochemistry, botany, entomology, forestry, genetics, nutrition, engineering, veterinary science, etc.

For information, write the Permanent Secretary, Hoblitzelle Foundation, Renner, Tex.

D. A. Macdonald Dies Following Short Illness

Dr. D. A. Macdonald, retired director of the Forestry Branch, Canada Department of Northern Affairs and National Resources, died of heart trouble May 5 after an illness of a few weeks.

At the time of his death Dr. Macdonald was serving as director of a consulting service. He retired from the Department of Northern Affairs and National Resources in October 1956 after serving as its director since 1948. He spent 42 years with the department.

His contributions to forestry were recognized internationally. He was a member of the advisory committee of FAO's forest research division and was the Canadian Government's delegate to The Third World Forestry Congress at Helsinki, Finland and the Fourth Congress in India. He served as chairman of the Sixth British Commonwealth Forestry Conference held in Canada in 1952.

In 1914 Dr. Macdonald graduated with the B.S. degree in forestry from the University of New Brunswick. The University awarded him the degree of Doctor of Laws in 1950.

Education

Receives National Science Foundation Fellowship

Stephen H. Spurr, professor of silviculture in University of Michigan School of Natural Resources, has won a science faculty fellowship from the National Science Foundation.

He will use the grant to study the natural variation of pines and aspens in the western United States and the general theory of forest ecology.

During the year of study, which begins September 1, Professor Spurr will be headquartered at the University of California.

Fourth Annual Midwestern Forestry Conclave Held at Purdue

Purdue University Forestry Club was host to the Fourth Annual Midwestern Forestry Club Conclave in May at the Sycamore Valley Camp, Lafayette, Ind.

More than 150 students represented four schools, Iowa State, Michigan State, Minnesota, and Purdue, at the gathering. The group participated in a number of contests during the day, with Purdue capturing the championship for the third consecutive year.

Dr. Durward Allen of Purdue gave the principal talk after dinner to climax the day's proceedings.

Watershed Research Program To Be Initiated at Penn State

A cooperative program of watershed management research in the oak-hickory forests of Pennsylvania will be initiated this spring. Cooperating on this project will be the School of Forestry of The Pennsylvania State University, the Pennsylvania Department of Forests and Waters, and the Northeastern Forest Experiment Station of the Forest Service. Each of these agencies will share equally in the responsibility for the research.

Several small watersheds near the University have been selected for study during the next five to ten years.

Actively leading the research on this project will be D. P. Worley, W. R. Byrnes, and W. E. Sopper of the School of Forestry, Penn State; Irvin C. Reigner and Dr. Harold Lull, Forest Service; and Joseph E. Ibberson and Eugene E. McNamara, Pennsylvania Department of Forests and Waters.

JOHN G. GUTHRIE
Consulting Forester
BOX 517 WIGGINS, MISS.
PHONE WALNUT 8-4958

WILLIAM A. EASTMAN, JR.
Consulting Forester
Complete Professional Service
SEATTLE 1, WASHINGTON
410 J. GREEN BUILDING
'Phone SEneca 2814

WILLIAM H. PRICE
FOREST MANAGEMENT
Specializing in
Timber Tax Problems
2626 W. Lynn—Seattle 99, Wash.
Al der 7482

Consulting Forester Forest Surveyor
JOHN STOCK
Specializing in Adirondack Forest and Tax Problems
Box 311 Tupper Lake, N. Y.

Staff Changes at Colorado State

Dean C. H. Wasser, College of Forestry and Range Management, Colorado State University, has announced two recent changes in the college's personnel.

Dr. Carl A. Newport resigned as associate professor of forestry to accept a position as research forester in the field of economics at the California Forest and Range Experiment Station, Berkeley.

Ben M. Huey has been appointed associate professor of forestry in the college and associate forester in the Agricultural Experiment Station.

New York Holds Sawmill Training Conference

The Fourth Annual Small Sawmill Training Conference will be held August 28-30 in the new, four-million dollar Hugh P. Baker Wood Products Laboratory building at the State University College of Forestry at Syracuse University, Syracuse, N. Y.

Professor Kenneth C. Compton of the Department of Forest Utilization will coordinate the conference.

F. F. Wangaard on Philippine Assignment

Frederick F. Wangaard, professor of lumbering at Yale University, New Haven, Conn., has been appointed a forestry adviser for the Philippines Forest Product Laboratory.

The appointment, made by the Food and Agriculture Organization of the United Nations, will be in effect for six months starting June 15.

Following his service in the Philippines, Prof. Wangaard will go to Oslo, Norway, under a Fulbright grant awarded under the U. S. Department of State's Educational Exchange Program. There he will conduct research in wood working and technology at the University of Oslo and at the Norwegian Institute of Technology.

Prof. Wangaard will fill these two posts during a year's leave of absence from Yale. Upon his return, he will resume teaching at the Yale School of Forestry.

Trouble Shooting in the Wood Furniture Industry

The sixth annual course, "Trouble Shooting in the Wood-Furniture Industry," will be held at the University of Michigan, Ann Arbor, August 5-10. Offered by the Department of Wood Technology and the Summer Session and Extension Service, the course is designed to help the industry save money by minimizing costly rejects or reworking of parts.

The course emphasizes analyses of actual production and service rejects to determine the cause of problems and preventive measures that could have been taken.

The total enrollment is limited to 18 persons with applications accepted in the order received. Advanced registration is necessary and may be made with the Institutes Department, Extension Service, University of Michigan, Ann Arbor. The fee is $125.00 per person and should accompany the application.

RAYMOND J. HOYLE

Professor R. J. Hoyle Retires

Professor Raymond J. Hoyle, chairman of the Department of Forest Utilization at the State University College of Forestry at Syracuse University, Syracuse, N. Y., will retire September 1, after close to 40 years of service to the college. No successor to replace him has been named as yet.

The announcement was made recently by Dr. Hardy L. Shirley, dean of the College of Forestry.

Professor Hoyle has the longest period of uninterrupted service to the college of any faculty or staff member.

Professor Hoyle was a member of the college's third entering class in September 1913. He graduated with a B.S. degree in June 1917. In 1930 he received his M.S. from Syracuse University.

On April 1, 1918, he was appointed to the faculty as an instructor in forest utilization. He was promoted to assistant professor in 1924; associate professor, 1937; and full professor in 1950. He became chairman of the Department of Forest Utilization in 1952. He is the author of many college publications and some 200 technical articles for professional magazines.

Professor Hoyle is a member of Phi Beta Kappa, Society of American Foresters, Acacia, Chi Eta Sigma, Sigma Xi, Alpha Xi Sigma, and Robin Hood.

Private & Industrial

Six Win NLMA Scholarships

Six forestry school students have been awarded scholarships by the National Lumber Manufacturers Association.

Each scholarship winner will receive a cash award of $500, travel expenses, and ten weeks' on-the-job training in wood products research this summer at the Washington, D. C. laboratory of the Timber Engineering Co., research affiliate of the National Lumber Manufacturers Association.

The winners are: William H. Hunt, Colorado A&M College; Roger F. Sutton, Yale University; John S. Fujii, University of Washington; Marvin F. Bengelsdorf, University of Michigan; Charles G. DeRidder, Michigan State University; and David A. Strause, Oregon State College.

Scott Paper Announces New Timberland Unit

The establishment of a new timberland unit and the assignment of additional forestry personnel to existing units has been announced by Scott Paper Company.

The new unit, to be known as Greene Timberlands, is a part of the increased acreage of forest lands which form Scott's Southern Timberlands.

Thomas R. Culpepper has been promoted to resident forester in charge of the Greene Timberlands. State Line, Miss. will serve as headquarters. Robert Aycock will be assistant resident forester.

PREVENT INSECT BITES WITH Dr. Scholl's REPEL-PAPER
Use like cleansing tissue to repel mosquitoes, gnats, chiggers, flies. Guaranteed effective and absolutely safe; non-toxic, non-irritating. At dealers everywhere.
Orchard Paper Co. • St. Louis 15, Mo.
10 Reusable Sheets in Plastic Pouch
25¢

Infringers and imitators warned.
3 Patents. Best material. Sold by the thousands.
Best Chrome Steel Strong, Durable
THE RENOWNED
CHARLES H. RICH
"Forest Fire Fighting Tool"
Write for Prices and Descriptions
C. H. RICH FOREST FIRE TOOL CO.
218 W. Bald Eagle St.
Lock Haven, Pa.

BAKED ENAMEL
METAL FORESTRY SIGNS
for WOODLAND BOUNDARY MARKERS—NO TRESPASSING & FIRE WARNING SIGNS—LOCATION MARKERS—CRUISER TAGS—etc., any size to your specifications. WRITE FOR QUOTATIONS ON ALL YOUR SIGN NEEDS. state size and quantity.
A. L. LIND COMPANY
5036 THOMAS AVENUE SOUTH
MINNEAPOLIS 10, MINNESOTA

GROW TREES
FOR XMAS TREES AND FORESTRY
Fir, Pine and Spruce in Variety
Seedlings and Transplants
Write for Price List
Suncrest Evergreen Nurseries
P.O. Box 305-G, Homer City, Penna

Photogrammetric
STEREOSCOPES - STEREOMETERS
SKETCHERS - PLOTTERS
HARRISON C. RYKER, INC.
1209 - 8th Ave. Oakland, Calif.

WHEN YOU WANT

√ Quick Service

√ Intelligent Handling of Your Needs

√ Personal Attention by People Who Understand

THE PLACE TO

Phone - Write - Wire - Come

Is

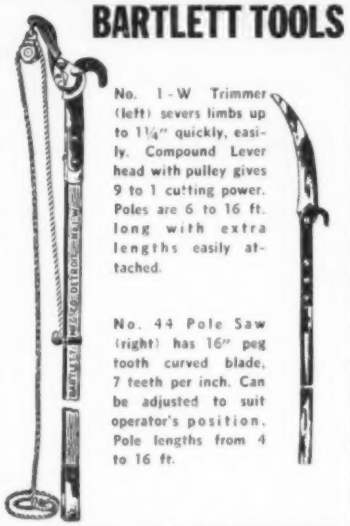
FORESTRY SUPPLIERS, INC.

JACKSON, MISSISSIPPI

Telephone 4-3565 P. O. Box 8305

P.S.—Dorabel's infanticipating ended May 11, 1957, with a seven-pound, ten-ounce boy—John Moore. Just thought you would like to know.
Jim Craig

EXPERT FORESTERS USE BARTLETT TOOLS



No. 1-W Trimmer (left) severs limbs up to 1¼" quickly, easily. Compound Lever head with pulley gives 9 to 1 cutting power. Poles are 6 to 16 ft. long with extra lengths easily attached.

No. 44 Pole Saw (right) has 16" peg tooth curved blade, 7 teeth per inch. Can be adjusted to suit operator's position. Pole lengths from 4 to 16 ft.

No. 114-B Special Utility Saw has 26" blade with diamond point teeth. Extra large grip permits wearing of gloves. Available with or without belt snap.

BARTLETT MFG. CO.
3015 E. Grand Blvd.
Detroit 2, Mich.

Write for Catalog No. 37 showing all tools.

HENRY BAHR

ing various positions in private industry and serving as legislative assistant in the Library of Congress.

In 1938, he organized NLMA's Law Information Service to provide association members with regular reports on Congressional developments and other government activities affecting the lumber industry.

From 1939 to 1954, Bahr headed NLMA's Statistical Department. He also helped organize the Forest Industries Council, policy-coordinating organization of the lumber, pulp and paper industries.

He is an Associate Member of the Society of American Foresters.

THE LOWTHER TREE PLANTER PLANTS 10,000 SEEDLINGS PER DAY!

With the Lowther Tree Planter, trees are properly planted for maximum survival in any soil because they have been given the right start.
Three distinct models available to cover all soil conditions and terrain.

For details, write:
THE HARRY A. LOWTHER COMPANY
INDUSTRY AVE., JOLIET, ILL.
By The Makers Of The Famous Lowther C-Saw

Two Receive Gair Woodlands Scholarships

T. W. Earle, president of Gair Woodlands Corporation, has announced the awarding of the corporation's 1957 scholarship to Robert Neil Kitchens of Thomson, Ga., and Melvin Jack Owen, Olustee, Fla.

Kitchens will enroll in forestry at the University of Georgia and Owen will study at the University of Florida. Each will receive $500 per year for four years of study.

Named NLMA Vice President

Henry Bahr, veteran staff member of the National Lumber Manufacturers Association, has been named vice president and general counsel of the association, president Walter M. Leuthold has announced.

Bahr will continue to serve as the association's secretary and director of its Law Information Service. The new titles were conferred by NLMA's Executive Committee, meeting recently in New Orleans.

A native of Webster, S. D., Bahr joined the headquarters of the NLMA, Washington, D. C., in 1936, after hold-

Public

Allen Heads Michigan Commission

Shirley W. Allen was elected chairman of the Michigan Conservation Commission at the April meeting of the seven-member policy making group. Gerald E. Eddy was reappointed director of the Department of Conservation.

Hydrologist Appointed to Washington Position

Promotion of Robert L. Hobba to the position of hydrologist, Division of Flood Prevention and River Basin Programs in the office of the chief of the Forest Service in Washington, D. C., has been announced by Regional Forester J. Herbert Stone of the Pacific Northwest Region of the U. S. Forest Service. Hobba has been a staff assistant in the regional Division of Recreation and Lands in Portland for the past two years. He will be replaced by Melvin P. Twerdal of the Pacific Northwest Forest and Range Experiment Station.

State Park Named in Honor of Pennsylvania Forester

The Pennsylvania Department of Forests and Waters has renamed Pennsylvania's Halfway State Park the Raymond B. Winter State Park. Ceremonies held on May 23 commemorated the event. Mr. Winter is a 1910 graduate of the old Mont Alto State Forestry School and was for years affiliated with the state forestry program in Pennsylvania. He later engaged in consulting work.

L. K. Halls Promotion Announced

Lowell K. Halls has been appointed assistant chief of the Division of Range and Watershed Management Research in the New Orleans office of the Southern Forest Experiment Station. Dr. R. S. Campbell is the Division chief.

Halls will be responsible for developing and coordinating Forest Service research on wildlife habitat and livestock grazing in forests of the Mid-south.

Halls received his bachelor's degree in forest and range management at Colorado A and M College and his master's degree at Texas A and M.

In his new position, Halls succeeds Hubert D. Burke, who is now in charge of studies of soil moisture relations being carried on at Vicksburg, Miss., in cooperation with the U. S. Army Corps of Engineers.

Cunningham Retires From Lake States Station

Russell N. Cunningham, 40-year employee of the U. S. Forest Service and chief of the Forest Economics Division of the Lake States Forest Experiment Station for the past 27 years, retired May 31.

Mr. Cunningham was assigned to the station in 1930 to take charge of the first systematic inventory of the Lake States forest resources ever to be made. A second more detailed survey is just being completed under his direction.

RUSSELL N. CUNNINGHAM

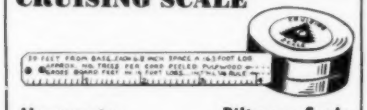
After graduating from the University of Idaho in 1917, Mr. Cunningham began his Forest Service career on the NezPerce National Forest in Idaho. He was next appointed an associate district forest inspector in 1924 at Missoula, Mont. In this capacity he supervised forest fire protection measures of cooperating agencies until his transfer to the Lake States Station in 1930.

Heads Recreation Program

Promotion of William N. Parke to a staff officer position in the office of the chief of the U. S. Forest Service in Washington, D. C. has been announced. In the Division of Recreation and Lands, Parke will direct the recreation part of "Operation Outdoors," a program for improving the handling of recreation on the national forests.

Parke in 1933 was appointed as forester on Willamette National Forest. From 1939 to 1942 he was in charge of recreation planning and development for the Forest Service in Alaska as a staff officer in the Division of Lands in the regional office at Juneau and held a similar position in the Pacific Northwest regional office from 1946 to 1953 and again during the past year. He has been active in the National Ski Patrol and in the Pacific Northwest Ski Association and has had training and experience in avalanche control on winter sports areas. He is a past chairman of the Division of Forest Recreation of the SAF and a forestry graduate of Oregon State College, 1933.

COMPLETE INVENTORY CRUISING SCALE



Hypsometer Biltmore Scale
Rigid When Open
Flexible 6-foot Steel Tape $3.00 EACH
Handy Chrome-plated Case 1¾" Dia.

CARL W. GETZ, *President*
KURFEW, INC.
Lansdale, Pa.

CUT COSTS 90%
PREVENT ACCIDENTS

• WASH WINDOWS FOUR STORIES HIGH
REMOVE LIGHT GLOBES 60 ft. up
• PRUNE TREES & PICK FRUIT 60 ft. up

Send for Free Catalog
DEPT. J . 300 S. Los Angeles St., L.A. 13, MA 6-9397

the NEW
POULAN F MODEL

- Light-weight
- Fast-cutting
- Precision-built

IT'S YOUR BEST DOLLAR VALUE IN A ONE-MAN CHAIN SAW

PROFITABLE . . . Cuts labor, operating cost and downtime

DURABLE . . . Precision-machined from tough materials for minimum wear

VERSATILE . . . Straight or plunge-bow blades for all cutting requirements

POULAN CHAIN SAWS

A QUALITY SAW!

SOUTH'S LARGEST CHAIN SAW MANUFACTURER

SHREVEPORT, LA.

INDEX TO ADVERTISERS

	Page
Adirondack Forestry, Inc.	553
Allis-Chalmers Mfg. Co.	498
Atkinson, S. Gayley	554
Banzhaf & Co., George	552
Bartlett Mfg. Co.	558
Belanger & Bourget	552
Blue Jet Corporation	547
Caterpillar Tractor Co.	Third Cover
Clark, Thomas G.	554
Clifton, Thomas C.	553
Crank, Porcius F. Jr.	554
Cranston, Keith	552
Eastman, Wm. A. Jr.	555
Fechheimer Bros., Co.	549
Forestry Suppliers	557
Foundation for American Resource Mgmt.	546
Guthrie, John G.	555
Hale Fire Pump Co.	550
Hall, Albert G.	554
Hammon, Jensen & Wallen	552
Homelite Corporation	Back Cover
Keene Forestry Assn.	545
Kurfew, Inc.	559
Lemieux, Frank J.	553
Lind Co., A. L.	556
Lowther Co., Harry A.	558
McCurdy Bros., Nurseries	549
Meadows, Ben	551
Melin Meteorological Service	545
Musser Forests, Inc.	549
Nat'l. Timber Consultants	554
Nelson Company	550
Northeast Forestry	554
Northern Tree	553
Orchard Paper Co.	556
Oregon Saw Chain Corp.	(Insert)
Panama Pump Co.	545
Pomeroy & McGowin	552
Pond & Moyer	553
Poulan Chain Saws	559
Prentiss & Carlisle	554
Price, Wm. H.	555
Rich, C. H., Forest Fire Tool Co.	556
Ryker, Harrison C.	556
Sanders, Paul M.	554
Sebrell Corp., J. B.	559
Sewall Co., James W.	552
Shannon, R. B.	553
Silva, Inc.	545
Smith Co., D. B.	Second Cover
Southern Coatings	548
Southern Seed Co.	545
Stock, John W.	555
Suncrest Evergreen Nurseries	556
Timber Mgmt. Service	554
Tree Farm Mgmt. Service	553
Utility Tool & Body Co.	549
Western Fire Equipment Co.	546
Weyerhaeuser Timber Co.	544
Winslow, Paul T.	553

Carroll Brown Promoted to Forest Supervisor

Promotion of Carroll E. Brown to the position of forest supervisor of Rogue River National Forest with headquarters at Medford, Ore., took effect June 1. For the past one and one-half years Brown has been a staff officer in the regional division of recreation and lands in Portland.

He replaces Jack Wood who is being promoted to a staff position in the office of the chief of the Forest Service in Washington, D. C.

Brown received his degree in forestry from Oregon State College in 1933. Appointments on the Nicolet, Chequamegon, Wenatchee, Mt. Hood and Gifford Pinchot forests followed.

He has subsequently served as a staff officer on the Olympic, Fremont, and Gifford Pinchot forests.

To Seek Use for Sawmill Waste

Plans are under way for an investigation of the use of sawdust and bark, combined with waste organic material, for soil conditioners to be conducted by the Washington State Institute of Forest Products, Seattle.

Dr. Stanley P. Gessel, assistant professor at the University of Washington, has been selected by the Institute's director, Gordon D. Marckworth, to direct the two-year project.

Interior Department Reports on 1956 Timber Sales

A total of 1,370,132,000 board feet of timber was sold from lands administered by the Department of the Interior during the calendar year 1956. In addition 99,806,000 feet were cut under free-use permits.

Total value of the harvest was $37,825,079, including $338,259 for that cut under free-use, and including the value of Christmas trees for which no board foot volume was recorded. Average value was $24.75 per thousand board feet, as compared with $22.99 for 1955. (In 1946, 911,157,000 board feet cut on Interior lands averaged $3.97 per thousand.)

Principal volume in 1956 came from lands administered by the Board of Indian Affairs: 738,897,000 ($14,410,266). Bureau of Land Management harvest: 702,753,000 ($22,644,691). Bureau of Sports Fisheries and Wildlife, National Park Service, and Bureau of Reclamation harvested lesser amounts.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

ASSISTANT TO EXPORT MANAGER

Needed by large lumber manufacturer and exporter. Must have lumber sales experience. Prefer forestry college graduate age 30-35. Excellent opportunity. Permanent, office in Southeast. Give details first letter enclosing snapshot. Address Export Department, Georgia-Pacific Corporation, P. O. Box 909, Augusta, Georgia.

Positions Wanted

Forester, B. S., Michigan State College 1950. Age 37, married, two children. Experienced in timber management, cruising, mapping, scaling, silviculture, photogrammetry. Previous experience with pulp industry 6 years, Forest Service in the Northeast. Will consider any positions related to forestry.
Box P, Journal of Forestry, Mills Building, Washington 6, D. C.

Land management specialist. Desire position with private company in Pacific Coast states. Experienced in forestry, land appraisal, right-of-way acquisition, and legal work. B.S.F., age 35, married, 4 children.
Box Q, Journal of Forestry, Mills Building, Washington 6, D. C.

Mature, creative, natural resource and forestry executive seeks challenging outlet through industrial, research, university, or foundation organization requiring reenforcement of top management and leadership. Strong analytical, planning, and human relations capabilities. Realistic about economics and politics. Not interested in narrow technical propositions. Compensation requirements open, but high. Managers facing frontier problems should investigate.
Box R, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S. Minnesota, 1941. Age 38, married, 4 children. Eleven years Tennessee Valley Authority, 4 years hardwood flooring company. Experienced in timber management, cruising surveys, nursery management, public relations, also lumber procurement and sales. Can supervise men and operate either office or woods operations. Desire position in Southeast with either pulp company or lumber industry.
Box S, Journal of Forestry, Mills Building, Washington 6, D. C.

Forest Utilization graduate, 1954, Colorado State University (Colorado A&M College). Age 25, married. Just completing 3 year tour in the Air Force. Experience includes logging, surveying, fire suppression, photogrammetry and work in Colorado Springs Forestry Dept. Desire position with private industry located in the western states. Available for work starting the middle of September.
Box T, Journal of Forestry, Mills Building, Washington 6, D. C.

This D4 piles slash from a daily cut of 50,000 bd. ft.

The White Swan Lumber Co., White Swan, Washington, uses this CAT* D4 Tractor with Fleco Root Rake in its selective logging operation on the Yakima Indian Reservation. The D4 piles slash from a daily cut of 50,000 bd. ft. It works an 8-hour day, 5 days a week. The company bought it for several reasons. Among them: the excellent reputation of the nearby Caterpillar Dealer for service and the excellent reputation of Caterpillar-built equipment for dependable performance under difficult conditions. Robert Turner, White Swan's superintendent, says: "We're very well satisfied with our D4."

Any machine can do the easy jobs. But it takes a tough machine to stand up day after day under the punishment of hard work. That's the kind of work heavy-duty Cat-built machines take in stride. For example, the D4 is compact and maneuverable, but rugged enough to handle any man-sized assignment in rough going—fighting fires, opening fire lanes or building roads. From its specially hardened track shoes and pins to its sturdy 63 HP (flywheel) Caterpillar Diesel Engine, it is built to outwork and outlast any machine in its power range. What's more, since it burns low-cost, non-premium fuel without fouling, it's economical to operate. And maintenance takes a minimum amount of time. The exclusive Caterpillar fuel system requires no adjusting.

Your Caterpillar Dealer backs every Caterpillar unit, no matter how old, with parts you can trust. He provides prompt service 24 hours a day. For complete facts about the D4, call on him. Better still, ask to see it working—he'll be glad to demonstrate!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

MODERN HEAVY-DUTY LOGGING EQUIPMENT FOR THE HARD JOBS

Try the 2 New . . . All New

HOMELITE CHAIN SAWS

6 Horsepower "Power Twins"

Take your pick! One of these two new Homelite Power Twins will do your woodcutting jobs faster, easier, more profitably.

Here's power . . . 6 full, hard-hitting horsepower . . . to make ever the toughest cutting jobs a cinch. *Here's light weight* . . . the lighte 6 horsepower chain saws in the world — for easier handling and more production with less effort. *Here's low-cost dependable operation.* Homelite's new short-stroke, high-compression engine minimizes wear and assures less down time, lower maintenance costs, longer chain saw life. Both "Power Twins" cut left, right, up, down, upside down to handle any type of job. Try *each* of the "Power Twins" and choose the one that's right for you.

6 Horsepower 22 Pounds

GEAR DRIVE

Top Production. Rugged 6 horsepower engine with gear drive gives you the lugging power to bring down the largest, toughest trees faster and easier. Built for hard, everyday use, the 6-22 is a real production cutter's tool.

More Profitable Cutting. This smooth-operating Homelite brings down time *down*. You get longer engine life, spend less time out-of-the-woods for maintenance and repairs . . . less time refueling the big new gas tank. You cut more efficiently for more profitable cutting.

Money-Saving Attachments. The Homelite 6-22 is the newest one man chain saw that has plunge-cut bow, brush cutter, and clearing attachments available. You can make a quick switch and be ready in seconds for any type of cutting.

Cuts through 20 inch trees in 18 seconds. Brings down trees up to 7 feet in diameter.

6 Horsepower 19 Pounds

DIRECT DRIVE

Easiest Handling. The EZ-6 weighs only 19 pounds — with every ounce perfectly balanced. Built for rugged professional use, this fast cutting 6 horsepower chain saw is extremely easy to handle — even an amateur can operate it with little strain or effort.

Fastest Cutting. This direct drive chain saw, with its fast chain speed and light weight, makes quick work of trees up to 5 feet in diameter. Packed with 6 full horsepower, it cuts 8" oak in 4 seconds, 18" pine in 12 seconds.

A Profitable Investment. The low-cost EZ-6 starts to pay for itself the first time you use it. Turns woodlots into big cash crops . . . cuts timber, pulpwood, fence posts, cordwood. This high speed direct drive chain saw has enough dependable power to make either full or part-time cutting profitable.

Cuts 8" hardwood in 4 seconds
Cuts 18" softwood in 12 seconds
Fells trees up to 5 feet in diameter

Homelite builds and sells more chain saws than any other company in the world.

WIN

A FREE CHAIN SAW EVERY YEAR FOR LIFE
IT'S EASY
Nothing to Buy
Nothing to Write
No Obligation

Just visit your Homelite dealer and have a free demonstration of the Homelite Power Twins. You may have *three* chances to win!

1. A free Homelite chain saw of your choice every year for life, or
2. One of 25 Homelite chain saws given away by Homelite District Offices.
3. Plus hundreds of Homelite Chain Saws given free by Homelite dealers in local contests.

Register Now! This promotion is limited to residents of the United States and is subject to local state, city and county laws.

Find Your Homelite Dealer in the "Yellow Pages"

HOMELITE

A DIVISION OF TEXTRON INC

4107 RIVERDALE AVENUE · PORT CHESTER, NEW YORK

Manufacturers of carryable pumps, generators, chain saws, blowers

A complete line of chain saws for every cutting job.